BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: Ross, et al.

Serial Number: 09/545,316

Filed: April 7, 2000

For: **SYSTEM AND METHOD FOR FACILITATING THE PRE-PUBLICATION PEER REVIEW PROCESS**

Group Art Unit: 2176 ~~1718~~ 5C

Examiner: T. Huynh 9-3003

Appeal Brief Pursuant to 37 C.F.R. § 1.192

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This communication is in response to the final Office Action ("Final Action") mailed December 18, 2002. On February 20, 2003, Appellants filed a Notice of Appeal from the Final Action. Accordingly, Appellants submit the corresponding Appeal Brief. Pursuant to the arguments presented herein in combination with the file history pertaining to the subject claims, Appellants respectfully request reconsideration and allowance of the application.

CERTIFICATE OF MAILING
(37 C.F.R. §1.8a)

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Introduction

Appellants filed the present patent application on March 7, 2000. On March 7, 2001 a petition to make special was filed by Appellants based on actual infringement pursuant to 37 C.F.R. § 1.102(d). A first office action was issued on July 6, 2001 rejecting all pending claims based on a combination of references. Appellants' attorney conducted a personal interview of the examiner and the primary examiner on July 30, 2001 during which the examiners suggested that certain claim amendments be made to overcome the prior art. These amendments were made and submitted in a formal reply on September 27, 2001. On December 26, 2001, an office action was issued that rejected all of the pending claims based on a new combination of references. On March 26, 2002, Appellants filed a reply presenting arguments in favor of patentability. On June 20, 2002, an office action was issued that rejected all of the pending claims based on a new combination of references.

Accordingly, on July 26, 2002 Appellants' attorney conducted a telephonic interview with the examiner and the primary examiner during which an agreement on the claims was reached after a discussion of the differences between the prior art and Appellants' invention. On September 20, 2002 Appellants submitted an amendment pursuant to the discussion and agreement during the interview. On December 18, 2002, the Final Action was issued that rejected all of the pending claims on yet another combination of references. Appellants filed a notice of appeal on February 20, 2003 and hereby submit the corresponding brief in support of patentability of all pending claims.

(1) Real Party in Interest

The real party in interest is Neoplasia Press, Inc., a Michigan corporation and the assignee of the patent application.

(2) Related Appeals and Interferences

Appellants are unaware of any related appeals or interference proceedings.

(3) Status of the Claims

At the time of filing this appeal brief, claims 1, 3, 4, 5, 6, 8, 9, 10, 11, 12, 15, 16, 19, 20, 23, and 24 are rejected. Each rejected claim is appealed. Claims 2, 7, 13, 14, 17, 18, 21, and 22 are canceled.

(4) Status of Amendments

No amendment has been filed subsequent to the Final Action.

(5) Summary of Invention

The invention provides a computer implemented method for peer review of articles. The claimed peer review method is conducted by a central server computer over a communications network such as the Internet. The parties to the peer review process are the author(s), the editor(s), and the reviewer(s). Initially, the server receives the article from the author via the communications network. (Page 20, Lines 9 – 20; Fig. 2, step 110). The server computer then extracts contextual information from the article to determine, for example, the subject matter of the article. (Page 11, Lines 16 – 20; Fig. 2, steps 140, 150). The server computer then queries a database containing profiles of potential reviewers to identify a qualified reviewer. (Page 12, Lines 12 – 13; Fig. 3, step 200). The server computer next assigns the qualified reviewer to the submitted article and provides an evaluation form to the reviewer. (Page 12, Lines 16 – 20; Fig. 3, step 230). Once the reviewer has reviewed the article and entered comments into the evaluation form (Page 15, Lines 12 – 13), the server computer receives a completed evaluation form from the reviewer (Page 16, Lines 13 – 14; Fig. 4, step 340) and provides that completed form to the author. (Page 17, Line 19 – Page 18, Line 3; Fig. 5, steps 400, 410, 420). Once the author has read the reviewer's comments and entered his own comments into the evaluation form (Page 18, Lines 4 – 12; Fig. 5, steps 430, 440), the server computer receives the same completed evaluation form with the author's comments juxtaposed with the reviewer's comments in a point-by-counterpoint format. (Page 18, Lines 13 – 16). The server computer provides this completed evaluation form (including the author's responses) to an editor. (Page 19, Lines 10 – 13; Fig. 6, step 520). The server computer next receives a publication decision from the editor (Page 19, Lines 14 – 16; Fig. 6, step 530) and then provides that publication decision to the author and the reviewer (Page 21, Lines 5 – 6; Fig. 7, step 660).

The invention also provides a separately patentable computer implemented method for peer review of articles. This additional claimed peer review method is also conducted by a central server computer over a communications network such as the Internet. The parties to the peer review process are the author(s), the editor(s), and the reviewer(s). Initially, the server receives the article from the author via the communications network. (Page 20, Lines 9 – 20; Fig. 2, step 110). The server computer then extracts contextual information from the article to

determine, for example, the subject matter of the article. (Page 11, Lines 16 – 20; Fig. 2, steps 140, 150). The server computer then queries a database containing profiles of potential reviewers to identify two or more qualified reviewers. (Page 12, Lines 12 – 13; Fig. 3, step 200). All of the qualified reviewers are then ranked by the server computer. (Page 13, Lines 9 – 10; Fig. 3, step 210). The server computer then contacts the qualified reviewers and requests an agreement by the qualified reviewer to review the article. (Page 13, Lines 15 – 22; Fig. 3, step 230). The server computer then receives agreements from one or more of the qualified reviewers and provides an evaluation form to each accepting reviewer. (Page 14, Lines 7 – 15; Fig. 3, step 240). Once the reviewer has reviewed the article and entered comments into the evaluation form (Page 15, Lines 12 – 13), the server computer receives a completed evaluation form from the reviewer (Page 16, Lines 13 – 14; Fig. 4, step 340) and provides that completed form to the author. (Page 17, Line 19 – Page 18, Line 3; Fig. 5, steps 400, 410, 420). Once the author has read the reviewer's comments and entered his own comments into the evaluation form (Page 18, Lines 4 – 12; Fig. 5, steps 430, 440), the server computer receives the same completed evaluation form with the author's comments juxtaposed with the reviewer's comments in a point-by-counterpoint format. (Page 18, Lines 13 – 16). The server computer provides this completed evaluation form (including the author's responses) to an editor. (Page 19, Lines 10 – 13; Fig. 6, step 520). The server computer next receives a publication decision from the editor (Page 19, Lines 14 – 16; Fig. 6, step 530) and then provides that publication decision to the author and the reviewer (Page 21, Lines 5 – 6; Fig. 7, step 660).

(6) Issues

A. Whether claims 1, 3, 5, 6, and 8 are patentable under 35 U.S.C. 103 over the combination of (1) Maddison; (2) Pope; (3) Mathews; (4) Kao; (5) Sumner; (6) Walker; and (7) Borovoy.

B. Whether claims 9, 10, 11, 12, 15, 19, 20, 23, and 24 are patentable under 35 U.S.C. 103 over the combination of (1) Pope; (2) Maddison; (3) Mathews; (4) Kao; (5) Sumner; (6) Walker; and (7) Borovoy.

C. Whether claim 4 is patentable under 35 U.S.C. 103 over the combination of (1) Maddison; (2) Pope; (3) Mathews; (4) Kao; (5) Sumner; (6) Walker; (7) Borovoy; and (8) Sato.

D. Whether claim 16 is patentable under 35 U.S.C. 103 over the combination of (1) Pope; (2) Maddison; (3) Mathews; (4) Kao; (5) Sumner; (6) Walker; (7) Borovoy; and (8) Sato.

(7) Grouping of Claims

The claims in Group A above do not stand or fall together.

The claims in Group B above do not stand or fall together.

(8) Argument

A. Whether claims 1, 3, 5, 6, and 8 are patentable under 35 U.S.C. 103 over the combination of (1) Maddison; (2) Pope; (3) Mathews; (4) Kao; (5) Sumner; (6) Walker; and (7) Borovoy.

Claims 1, 3, 5, and 8 stand or fall together.

Independent claim 1 was rejected in the Final Action based on a combination of the references listed above. In particular, the rejection relies on Maddison and Mathews, which are cited as teaching certain steps as follows:

Maddison -providing the completed evaluation form to the author;
-receiving a response from the author directly in the completed evaluation form;
-providing the completed evaluation form with author responses to an editor;

Mathews -providing the completed evaluation form to the author;

These references, however, standing alone or in combination fail to teach the three elements as demonstrated below.

Maddison -providing the completed evaluation form to the author;

The Final Action cites Maddison at page 2, lines 27 – 29 and 33[1] as teaching this element. Specifically, Maddison states:

> Reviews are usually conducted on-line, with the reviewer typing comments about individual sections of a contribution into the windows of a structured evaluation form provided on a special peer-review web page.
> ***Maddison, Page 2, Lines 36 – 38.***
>
> The comments furnished by the reviewers are passed along to the authors.
> ***Maddison, Page 3, Line 1.***

Upon review of the cited passages, Maddison expressly teaches that the reviewer types comments into a structured evaluation form that is provided on a special peer-review web page. It is also expressly taught that those comments are passed along to the authors. What Maddison fails to teach is that the completed evaluation form is provided to the author, as required by claim 1. At best, Maddison is silent with respect to teaching that the completed evaluation form is provided to the author because its express teachings only state that the comments are passed along to the author. Importantly, Maddison does not expressly teach that the completed evaluation form is provided to the author.

In *Ex parte Sarallo*, 2002 WL 1801499 (Bd.Pat.App & Interf.), the Board found that there was no express teaching of the subject matter asserted by the examiner to be present at the cited location in the reference. *Ex part Sarallo*, at 2. Furthermore, the Board found that the reference relied upon by the Examiner was silent as to the operation of the claimed element. *Id.* Maddison is equally silent as to providing the completed evaluation form to the author. In *Ex parte Sarallo*, the Board reversed the 103 rejection of the claim and stated that to interpret the

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[1] Appellants have submitted copies of the non-patent references discussed in this appeal brief as Exhibits A – D to provide a consistent frame of reference for the page numbers and line numbers with respect to each reference. Appellants' review of the references with respect to the Examiner's citations reveal that the Examiner's copies (which have not been provided to Appellants) have slightly different page and line numbering than Appellants' copies.

cited reference as teaching the claimed element would be speculation on its part, which the Board stated it would not do. *Id.* Appellants request that the Board also refrain from speculation here and reverse the rejection of claim 1.

Additionally, in *Ex parte Ban*, 1996 WL 1748734 (Bc.Pat.App & Interf.), the Board found that each specification of two references were silent as to the spatial relationship of certain elements required by the claim, even though the figures in both references showed the elements arranged with spacing. *Ex parte Ban*, at 3. The Board stated that under the circumstances, where the references were silent, the examiner's position that the reference suggested the claimed element was not well taken. *Id.*, at 4. Moreover, the Board further acknowledged that the examiner's reading of what the references suggested was based on hindsight gleaned from reading the Appellants disclosure rather than on the fair teachings of the references. Similarly here, a reading of Maddison that it suggests providing the completed evaluation form to the author necessarily requires the benefit of Appellants' disclosure because such a step is not expressly taught or fairly suggested by Maddison. Accordingly, Appellants respectfully request that the rejection of claim 1 based on Maddison be reversed.

Maddison -receiving a response from the author directly in the completed evaluation form;

The Final Action cites Maddison as teaching "receiving a response from the author (Maddison, page 3, lines 1 – 7, teaches that the author responses [sic] to the reviewers when the author decline [sic] to make the requested changes from the reviewer)." Specifically, Maddison states:

> The comments furnished by the reviewers are passed along to the authors. If the reviewers recommend that a contribution be revised, the authors are asked to amend the page and resubmit it to the editor. Authors may at this point decline to make the requested changed, but they would be expected to support their opinion with plausible arguments. Any such explanation would first be considered by the editor-in-chief in consultation with associate editors, but it might also be forwarded to the reviewers for further comment.
> ***Maddison, Page 3, Lines 1 – 7.***

The cited passage here states that an author is expected to support her decision not to amend and resubmit the page with plausible arguments. Maddison further states that any such arguments would be considered by the editors and possibly the reviewers. Thus, although Maddison teaches that responses from the authors are received, what Maddison fails to teach is that the responses from the author are received directly in the completed evaluation form, as required by claim 1. At best, Maddison is silent with respect to teaching that the author's comments are received directly in the evaluation form because its express teachings only state that "authors would be expected to support their opinion with plausible arguments" and that "[a]ny such explanation would first be considered by the editor-in-chief...". Importantly, Maddison does not expressly teach receiving a response from the author directly in the completed evaluation form.

Ex parte Sarallo and *Ex parte Ban* are equally applicable here because this claim element is not expressly taught or fairly suggested by Maddison. Thus, any reading of Maddison by Board that it teaches or suggests receiving a response from the author directly in the completed evaluation form would be speculation. Moreover, similar to *Ex parte Ban*, the position in the Final Action that Maddison, although silent, teaches this step suggests that the examiner's reading of Maddison is based on hindsight gleaned from reading the Appellants disclosure rather than on the fair teachings of the reference. Accordingly, Appellants respectfully request that that the Board refrain from speculation and hindsight here and that the rejection of claim 1 based on Maddison be reversed.

Maddison -providing the completed evaluation form with author responses to an editor;

The Final Action cites Maddison as teaching "providing the author responses to an editor (Maddison, page 3, lines 1 – 7, teaches that the editors consider the author response.)" The language from Maddison, page 3, lines 1 – 7 is set forth in full above.

Notably, the claim element is not merely the limitation that the author's responses are provide to an editor as the examiner suggests. Rather, the claimed element is providing the completed evaluation form with author responses to an editor. The claimed limitation is considerably different than the limitation rejected by the examiner and the cited passage does not fairly teach or suggest the claimed element.

As with the elements addressed above, Maddison is at best silent with respect to teaching the claimed element of providing the completed evaluation form with author responses to an editor. As explained in the specification (page 18, line 4 – page 19, line 4; and page 19, lines 14 – 16), this point by counter-point manner of presenting the reviewer's comments and the author's responses simplifies the editor's examination of the article, the review and the corresponding remarks, which in turn expedites the publication recommendation and decision and thereby reduces the time to publication for the article. Notably, a clear advantage associated with providing the completed evaluation form with author responses to an editor includes an accelerated peer review process.

Pursuant to *Ex parte Sarallo* and *Ex parte Ban*, the Maddison reference does not expressly teach and does not fairly suggest providing the completed evaluation form with author responses to an editor and therefore, the rejection should not be maintained. Furthermore, a reading of Maddison that suggests that it teaches providing the completed evaluation form with author responses to an editor can only be based on the benefit of hindsight gleaned from Appellants disclosure and therefore the rejection should not be maintained. Appellants respectfully request that the rejection of claim 1 be reversed by the Board.

Mathews -providing the completed evaluation form to the author;

The Final Action buttresses its rejection of this claim element based on Maddison with an additional rejection based on Mathews. The Final Action cites Mathews as teaching "providing the completed evaluation form to the author (Mathews, page 3, lines 33 – 35 and page 7, lines 22 – 33; the score and the comments are mailed to the author)."

Specifically, Mathews states:

> Peer Review Processes
> The Peer Review Processes provide a facility for managing all of the peer review processes of the conference, which is discussed in detail later.
> ***Mathews, page 3, Lines 36 – 38.***
>
> Submission Reviews
> Once papers are assigned, reviewers will have access to these papers and be able to enter the grading information. The reviewer gets a list of papers, and when a paper is selected, an evaluation

> form is filled in with the information about that paper. The reviewer grades the paper according to several criteria (relevance, originality, correctness, and quality) on a scale from 1 to 5 where 1 is the poorest and 5 is the best score. In addition to these numeric scores the reviewer must also include private comments about the paper to understand later, for example, why relevance for a paper was a "4" and not a "5". These comments are important in the refereeing process to select borderline papers that may or may not be accepted. There is also a comments field to suggest modifications needed for the paper to be accepted, which are mailed to the author along with the scores. The committee may examine a single review or examine all reviews for a given paper to ensure that the scores between two reviewers do not differ by more than one point in which case the committee must confer with the reviewers to re-evaluate their decisions and bridge the gap between the scores.
>
> The private comments and modifications to authors' comments were initially stored within the Oracle database assignments table, but problems surfaced owing to Oracle's limitations on string data types within SQL statements. A *VARCHAR2* datatype (a variable character type) cannot exceed 2,000 characters, and the reviewers entering long reviews (> 2,000 characters) resulted in some comments being truncated. The WWW5 EMS stores the comments in external ASCII files that are outside the Oracle database but accessible from the EMS's forms interface as well as directly readable from the file system. Within the database the file name of the comments is stored and a special flag within the form triggers the CGI program to read the contents of the file and insert this into the form's *TEXTAREA* field for editing.
>
> ***Mathews, page 7, Lines 9 – 36.***

Here, Mathews is clear that the evaluation form is filled in with the information about that paper, including grades according to several criteria (in numerical score format), private comments, and modification comments. Mathews expressly states that these modification comments and the scores and the numerical scores are mailed to the author. What Mathews does not teach or suggest is that the completed evaluation form is provided to the author, as required by this element of claim 1.

Notably, the evaluation form taught by Mathews includes the private comments field and Mathews does not expressly teach and does not fairly suggest that the private comments are mailed to the author. To the contrary, Mathews teaches that the private comments field is necessary for later understanding of the various scores for a paper and to facilitate the refereeing

process for borderline papers that may or may not be accepted. Thus, Mathews does not teach that the completed form is provided to the author because the private comments are part of the completed form according to Mathews.

Accordingly, Mathews is at best silent with respect to providing the completed evaluation form to the author and therefore any reading of Mathews that it teaches this step would be speculation and based on hindsight gleaned from reading Appellants disclosure. *Ex parte Sarallo*, at 2; *Ex parte Ban*, at 4. Mathews therefore fails to cure the fatal defect of Maddison with respect to the element of providing the completed evaluation form to the author. Consequently, because the cited prior art does not teach or disclose this element and the rejection of claim 1 should be reversed and claim 1 and its dependent claims should be allowed.

Prima Facia Obviousness Not Met for Claim 1

Appellants assert that the tenuous seven (7) way obviousness rejection of independent claim 1 fails to make a prima facia case of obviousness because no motivation to combine the seven (7) references has been identified in the Final Action. In particular, no expressly stated or implied suggestions are contained in the references to indicate to one having ordinary skill in the art that the seven (7) references should be combined to arrive at Appellants' method for peer review over a communications network.

Specifically, the Final Action cites the Kao reference as teaching "a form is transmitted among several user to review includes comments which are entered directly in the form (Kao, col. 5, lines 8 – 10; col. 5, lines 17 – 40; and fig. 4)." Kao states:

> A form may be transmitted only from one user to another user, or it may be transmitted serially among several users in turn.
> ***Kao, Column 5, Lines 8 – 10.***

> Associated with the Sales Forecast Report form 401 is audit trail 410. Audit trail 410 lists the various users that receive or use the report. In the example of FIG. 4, the Sales Forecast Report was created and submitted by user James Doe. The report was then transmitted to user Jeff Doe for approval, and then to user John Doe for final approval. In one embodiment of the present invention, as a user receives the report, the name or identification of that user is appended to the audit trail. The audit trail 410 of Sales Forecast Report 401 contains several fields for the display of pertinent information regarding each user's activities regarding the

> report. Such information includes a "User" field 414 that identifies the user by name or similar identification (e.g., employee number), and an "Action" field 416 that lists the action taken on the form by each respective user. In the example of FIG. 4, the action field indicates that user James Doe submitted the form, and the subsequent recipients of the form both approved the form. The "Time" field 418 provides the date and time at which a user performed the action on the report. A comment field 420 is provided to allow a user to type text information pertaining to the report or any action taken with respect to the form, or any other desired information. In most implementations, each transaction involving a particular form or document will be assigned a transaction number that identifies a particular transaction. The "No." field 412 provides the display area for the transaction number associated with each audit trail entry. These numbers may be assigned chronologically so that higher numbers correspond to later transactions.
> ***Kao, Column 6, Lines 17 – 45.***
>
> ***Fig. 4 is reproduced as Exhibit E.***

Kao teaches an audit history for a database form. The audit history contains information describing the transmission history of the document and any action taken with regard to the document. The audit history is updated automatically as the document is transmitted from one user to another user in the network. (Kao, Column 2, Lines 10 – 23). Kao teaches that a form can be transmitted between users in a network (Kao, Column 5, Lines 8 – 10) and provides as an example a description of a Sales Forecast Report (Fig. 4) that is passed to three users. (Kao, Column 6, Lines 17 – 45). The audit trail of the three users is shown as element 410 in Fig. 4.

What Kao fails to disclose is any reason, suggestion, motivation or teaching to combine its database form audit history to peer review of articles. The Final Action states that "[i]t would have been obvious to a person of ordinary skill in the art at the time the invention was made to have modified Kao into Maddison, Pope, and Mathews to allow the author responses [sic] to the reviewers evaluation form directly in the completed evaluation form and providing the completed evaluation with author responses to an editor to facilitate the peer review process, since this would have helped the reviewers, authors, and editor are [sic] able to use the evaluation form to communicate to each other in peer review conducted on-line." The Final Action, however, fails to identify a motivation, teaching or suggestion to combine the prior art to provide a method for peer review as claimed by Appellants. Thus, the Final Action fails to make

a prima facia case of obviousness because no teaching, suggestion, or motivation to combine is found in the references.

Claim 6 stands alone.

Dependent claim 6 is separately patentable because it introduces the concepts of reformatting the article into a standard format and then presenting the reformatted article to the author for approval. The advantages of a standard format and a quality review by the author prior to sending the article to a reviewer are numerous and specifically include the insurance that the article that is ultimately provided to a reviewer and ultimately an editor is presented as the author intends and in the format that the reviewer or editor expects. Reformatting of a document into a standard format is not trivial and certainly many formatting errors can occur such as the decoupling of text and figures, just to name one example. Furthermore, allowing an author to approve the reformatted article at this point in the process facilitates the initial review and makes the entire review process more efficient. Thus, reformatting the document into a standard format and presenting the reformatted article to the author for approval are discrete concepts that are separately patentable from the claimed computer implemented method for peer review presented in the base claim.

The Final Action cites the Pope reference as teaching the step of presenting the final version article to the author for approval (Pope, page 7, lines 7 – 9; see also page 5, under the heading "Manuscript tracking and peer review: publication" in Appellants' version). The Final Action acknowledges that Pope does not expressly teach the claimed element of presenting the reformatted article to the author for approval. The Final Action states that it would have been obvious to present the reformatted article to the author for approval because the final version of the article is presented to the author.

Here, as in *In re Ban*, the examiner's reading of what is taught or suggested in Pope appears to be based on hindsight gleaned from the benefit of reading Appellants' disclosure rather than on the fair teachings of the reference. Therefore, Appellants respectfully request that the rejection of claim 6 be reversed.

B. Whether claims 9, 10, 11, 12, 15, 19, 20, 23, and 24 are patentable under 35 U.S.C. 103 over the combination of (1) Pope; (2) Maddison; (3) Mathews; (4) Kao; (5) Sumner; (6) Walker; and (7) Borovoy.

Claims 9, 10, 15, 19, 20, 23, and 24 in Group B above stand or fall together.

Independent claim 9 was rejected in the Final Action based on a combination of the references listed above. In particular, the rejection relies on Maddison and Mathews which are collectively cited as teaching certain steps as follows:

Maddison -providing the author with the completed evaluation form;
-receiving a response from the author directly in the completed evaluation form;
-providing the completed evaluation form with author responses to an editor;

Mathews -providing the author with the completed evaluation form;

These references, however, standing alone or in combination fail to teach the three elements as demonstrated below.

Maddison - providing the author with the completed evaluation form;

The Final Action cites Maddison at page 2, lines 27 – 29 and 33 as teaching this element. Specifically, Maddison states:

> Reviews are usually conducted on-line, with the reviewer typing comments about individual sections of a contribution into the windows of a structured evaluation form provided on a special peer-review web page.
> ***Maddison, Page 2, Lines 36 – 38.***
>
> The comments furnished by the reviewers are passed along to the authors.
> ***Maddison, Page 3, Line 1.***

Upon review of the cited passages, Maddison expressly teaches that the reviewer types comments into a structured evaluation form that is provided on a special peer-review web page.

It is also expressly taught that those comments are passed along to the authors. What Maddison fails to teach is that the completed evaluation form is provided to the author, as required by claim 9. At best, Maddison is silent with respect to teaching that the completed evaluation form is provided to the author because its express teachings only state that the comments are passed along to the author. Importantly, Maddison does not expressly teach that the completed evaluation form is provided to the author.

As previously discussed, in *Ex parte Sarallo*, the Board found that there was no express teaching of the subject matter asserted by the examiner to be present at the cited location in the reference. *Ex part Sarallo*, at 2. Furthermore, the Board found that the reference relied upon by the Examiner was silent as to the operation of the claimed element. *Id.* Maddison is equally silent as to providing the completed evaluation form to the author. In *Ex parte Sarallo*, the Board reversed the 103 rejection of the claim and stated that to interpret the cited reference as teaching the claimed element would be speculation on its part, which the Board stated it would not do. *Id.* Appellants request that the Board also refrain from speculation here and reverse the rejection of claim 9.

As also previously discussed, in *Ex parte Ban*, the Board found that each specification of two references were silent as to the spatial relationship of certain elements required by the claim, even though the figures in both references showed the elements arranged with spacing. *Ex parte Ban*, at 3. The Board stated that under the circumstances, where the references were silent, the examiner's position that the reference suggested the claimed element was not well taken. *Id.*, at 4. Moreover, the Board further acknowledged that the examiner's reading of what the references suggested was based on hindsight gleaned from reading the Appellants disclosure rather than on the fair teachings of the references. Similarly here, a reading of Maddison that it suggests providing the completed evaluation form to the author necessarily requires the benefit of Appellants' disclosure because such a step is not expressly taught or fairly suggested by Maddison. Accordingly, Appellants respectfully request that the rejection of claim 9 be reversed.

Maddison -receiving a response from the author directly in the completed evaluation form;

The Final Action cites Maddison as teaching "receiving a response from the author (Maddison, page 3, lines 1 – 7, teaches that the author responses [sic] to the reviewers when the author decline [sic] to make the requested changes from the reviewer)." Specifically, Maddison states:

> The comments furnished by the reviewers are passed along to the authors. If the reviewers recommend that a contribution be revised, the authors are asked to amend the page and resubmit it to the editor. Authors may at this point decline to make the requested changed, but they would be expected to support their opinion with plausible arguments. Any such explanation would first be considered by the editor-in-chief in consultation with associate editors, but it might also be forwarded to the reviewers for further comment.
> ***Maddison, Page 3, Lines 1 – 7.***

The cited passage here states that an author is expected to support her decision not to amend and resubmit the page with plausible arguments. Maddison further states that any such arguments would be considered by the editors and possibly the reviewers. Thus, although Maddison teaches that responses from the authors are received, what Maddison fails to teach is that the responses from the author are received directly in the completed evaluation form, as required by claim 9. At best, Maddison is silent with respect to teaching that the author's comments are received directly in the evaluation form because its express teachings only state that "authors would be expected to support their opinion with plausible arguments" and that "[a]ny such explanation would first be considered by the editor-in-chief...". Importantly, Maddison does not expressly teach receiving a response from the author directly in the completed evaluation form.

Ex parte Sarallo and *Ex parte Ban* are equally applicable here because this claim element is not expressly taught or fairly suggested by Maddison. Thus, any reading of Maddison by Board that it teaches or suggests receiving a response from the author directly in the completed evaluation form would be speculation. Moreover, similar to *Ex parte Ban*, the position in the Final Action that Maddison, although silent, teaches this step suggests that the examiner's

reading of Maddison is based on hindsight gleaned from reading the Appellants disclosure rather than on the fair teachings of the reference. Accordingly, Appellants respectfully request that that the Board refrain from speculation and hindsight here and that the rejection of claim 9 based on Maddison be reversed.

Maddison -providing the completed evaluation form with author responses to an editor;

The Final Action cites Maddison as teaching "providing the author responses to an editor (Maddison, page 3, lines 1 – 7, teaches that the editors consider the author response.)" The language from Maddison, page 3, lines 1 – 7 is set forth in full above.

Notably, the claim element is not merely the limitation that the author's responses are provided to an editor as the examiner suggests. Rather, the claimed element is providing the completed evaluation form with author responses to an editor. The claimed limitation is considerably different than the limitation rejected by the examiner and the cited passage does not fairly teach or suggest the claimed element.

As with the elements addressed above, Maddison is at best silent with respect to teaching the claimed element of providing the completed evaluation form with author responses to an editor. As explained in the specification (page 18, line 4 – page 19, line 4; and page 19, lines 14 – 16), this point by counter-point manner of presenting the reviewer's comments and the author's responses simplifies the editor's examination of the article, the review and the corresponding remarks, which in turn expedites the publication recommendation and decision and thereby reduces the time to publication for the article. Notably, a clear advantage associated with providing the completed evaluation form with author responses to an editor includes an accelerated peer review process.

Pursuant to *Ex parte Sarallo* and *Ex parte Ban*, the Maddison reference does not expressly teach and does not fairly suggest providing the completed evaluation form with author responses to an editor and therefore, the rejection should not be maintained. Furthermore, a reading of Maddison that suggests that it teaches providing the completed evaluation form with author responses to an editor can only be based on the benefit of hindsight gleaned from Appellants disclosure and therefore the rejection should not be maintained. Appellants respectfully request that the rejection of claim 9 be reversed by the Board.

Mathews -providing the completed evaluation form to the author;

The Final Action buttresses its rejection of this claim element based on Maddison with an additional rejection based on Mathews. The Final Action cites Mathews as teaching "providing the completed evaluation form to the author (Mathews, page 3, lines 33 – 35 and page 7, lines 22 – 33; the score and the comments are mailed to the author)."

Specifically, Mathews states:

> Peer Review Processes
> The Peer Review Processes provide a facility for managing all of the peer review processes of the conference, which is discussed in detail later.
> ***Mathews, page 3, Lines 36 – 38.***
>
> Submission Reviews
> Once papers are assigned, reviewers will have access to these papers and be able to enter the grading information. The reviewer gets a list of papers, and when a paper is selected, an evaluation form is filled in with the information about that paper. The reviewer grades the paper according to several criteria (relevance, originality, correctness, and quality) on a scale from 1 to 5 where 1 is the poorest and 5 is the best score. In addition to these numeric scores the reviewer must also include private comments about the paper to understand later, for example, why relevance for a paper was a "4" and not a "5". These comments are important in the refereeing process to select borderline papers that may or may not be accepted. There is also a comments field to suggest modifications needed for the paper to be accepted, which are mailed to the author along with the scores. The committee may examine a single review or examine all reviews for a given paper to ensure that the scores between two reviewers do not differ by more than one point in which case the committee must confer with the reviewers to re-evaluate their decisions and bridge the gap between the scores.
> The private comments and modifications to authors' comments were initially stored within the Oracle database assignments table, but problems surfaced owing to Oracle's limitations on string data types within SQL statements. A *VARCHAR2* datatype (a variable character type) cannot exceed 2,000 characters, and the reviewers entering long reviews (> 2,000 characters) resulted in some comments being truncated. The WWW5 EMS stores the comments in external ASCII files that are outside the Oracle database but

> accessible from the EMS's forms interface as well as directly readable from the file system. Within the database the file name of the comments is stored and a special flag within the form triggers the CGI program to read the contents of the file and insert this into the form's *TEXTAREA* field for editing.
> ***Mathews, page 7, Lines 9 – 36.***

Here, Mathews is clear that the evaluation form is filled in with the information about that paper, including grades according to several criteria (in numerical score format), private comments, and modification comments. Mathews expressly states that these modification comments and the scores and the numerical scores are mailed to the author. What Mathews does not teach or suggest is that the completed evaluation form is provided to the author, as required by this element of claim 9.

Notably, the evaluation form taught by Mathews includes the private comments field and Mathews does not expressly teach and does not fairly suggest that the private comments are mailed to the author. To the contrary, Mathews teaches that the private comments field is necessary for later understanding of the various scores for a paper and to facilitate the refereeing process for borderline papers that may or may not be accepted. Thus, Mathews does not teach that the completed form is provided to the author because the private comments are part of the completed form according to Mathews.

Accordingly, Mathews is at best silent with respect to providing the completed evaluation form to the author and therefore any reading of Mathews that it teaches this step would be speculation and based on hindsight gleaned from reading Appellants disclosure. *Ex parte Sarallo*, at 2; *Ex parte Ban*, at 4. Mathews therefore fails to cure the fatal defect of Maddison with respect to the element of providing the completed evaluation form to the author. Consequently, because the cited prior art does not teach or disclose this element and the rejection of claim 9 should be reversed and claim 9 and its dependent claims should be allowed.

Prima Facia Obviousness Not Met for Claim 9

Appellants assert that the tenuous seven (7) way obviousness rejection of independent claim 9 fails to make a prima facia case of obviousness because no motivation to combine the seven (7) references has been identified in the Final Action. In particular, no expressly stated or implied suggestions are contained in the references to indicate to one having ordinary skill in the

art that the seven (7) references should be combined to arrive at Appellants' method for peer review over a communications network.

Specifically, the Final Action cites the Kao reference as teaching "a form is transmitted among several user to review includes comments which are entered directly in the form (Kao, col. 5, lines 8 – 10; col. 5, lines 17 – 40; and fig. 4)." Kao states:

> A form may be transmitted only from one user to another user, or it may be transmitted serially among several users in turn.
> ***Kao, Column 5, Lines 8 – 10.***

> Associated with the Sales Forecast Report form 401 is audit trail 410. Audit trail 410 lists the various users that receive or use the report. In the example of FIG. 4, the Sales Forecast Report was created and submitted by user James Doe. The report was then transmitted to user Jeff Doe for approval, and then to user John Doe for final approval. In one embodiment of the present invention, as a user receives the report, the name or identification of that user is appended to the audit trail. The audit trail 410 of Sales Forecast Report 401 contains several fields for the display of pertinent information regarding each user's activities regarding the report. Such information includes a "User" field 414 that identifies the user by name or similar identification (e.g., employee number), and an "Action" field 416 that lists the action taken on the form by each respective user. In the example of FIG. 4, the action field indicates that user James Doe submitted the form, and the subsequent recipients of the form both approved the form. The "Time" field 418 provides the date and time at which a user performed the action on the report. A comment field 420 is provided to allow a user to type text information pertaining to the report or any action taken with respect to the form, or any other desired information. In most implementations, each transaction involving a particular form or document will be assigned a transaction number that identifies a particular transaction. The "No." field 412 provides the display area for the transaction number associated with each audit trail entry. These numbers may be assigned chronologically so that higher numbers correspond to later transactions.
> ***Kao, Column 6, Lines 17 – 45.***

> ***Fig. 4 is reproduced as Exhibit E.***

Kao teaches an audit history for a database form. The audit history contains information describing the transmission history of the document and any action taken with regard to the

document. The audit history is updated automatically as the document is transmitted from one user to another user in the network. (Kao, Column 2, Lines 10 – 23). Kao teaches that a form can be transmitted between users in a network (Kao, Column 5, Lines 8 – 10) and provides as an example a description of a Sales Forecast Report (Fig. 4) that is passed to three users. (Kao, Column 6, Lines 17 – 45). The audit trail of the three users is shown as element 410 in Fig. 4.

What Kao fails to disclose is any reason, suggestion, motivation or teaching to combine its database form audit history to peer review of articles. The Final Action states that "[i]t would have been obvious to a person of ordinary skill in the art at the time the invention was made to have modified Kao into Maddison, Pope, and Mathews to allow the author responses [sic] to the reviewers evaluation form directly in the completed evaluation form and providing the completed evaluation with author responses to an editor to facilitate the peer review process, since this would have helped the reviewers, authors, and editor are [sic] able to use the evaluation form to communicate to each other in peer review conducted on-line." The Final Action, however, fails to identify a motivation, teaching or suggestion to combine the prior art to provide a method for peer review as claimed by Appellants. Thus, the Final Action fails to make a prima facia case of obviousness because no teaching, suggestion, or motivation to combine is found in the references. Appellants therefore respectfully request that the rejection of claim 9 and its dependent claims be reversed by the Board.

Claims 11 and 12 stand or fall together.

Claim 11 is patentably distinct because it introduces the concept of allowing a reviewer to gain access to reviews of the same article that were completed by other co-reviewers. The advantages of doing so are numerous and include raising the experience level of a reviewer by exposure to reviews of the same article and homogenizing the format and style of future reviews so that the review process can be more efficient. Thus, allowing reviewers to self-critique their own work by contemplating other reviewers' work is a discrete concept that is separately patentable from the claimed computer implemented method for peer review presented in the base claim.

In its rejection, the Final Action admits that Mathews does not disclose a reviewer gaining access to other completed evaluation forms after submitting an evaluation form for the same article. Yet, the Final Action maintains that it would have been obvious to do so "to

provide honesty [sic] evaluation, since examining other completed evaluation form for the same article before evaluate and submit it would have influenced the reviewer' point of view in evaluating process."

Similar to *In re Ban*, the examiner's reading of what is taught or suggested in Mathews appears to be based on hindsight gleaned from the benefit of reading Appellants' disclosure rather than on the fair teachings of the reference. The Final Action provides no disclosure, express or suggested, that states or implies that reviewers gain access to completed evaluation forms after submitting a completed evaluation form for the same article. The prior art does not teach this step and therefore, Appellants respectfully request that the rejection of claim 11 and its dependent claim 12 be reversed.

C. Whether claim 4 is patentable under 35 U.S.C. 103 over the combination of (1) Maddison; (2) Pope; (3) Mathews; (4) Kao; (5) Sumner; (6) Walker; (7) Borovoy; and (8) Sato.

Claim 4 requires that upon receipt of an article from an author, a ranked list of keywords related to the article is generated, the ranked list of keywords is provided to the author, and the author approves the ranked list of keywords. This concept is advantageous because it allows the author a measure of quality control over the computer implemented process for deriving keywords from the article, and indirectly allows a measure of quality control of the assignment of reviewers for the article.

The Final Action cites the Pope reference as teaching the step of receiving an approval of the final version article from the author (Pope, page 7, lines 7 – 9; see also page 5, under the heading "Manuscript tracking and peer review: publication" in Appellants' version). The Final Action, however, after acknowledging that Pope does not expressly teach the claimed steps for generating a ranked list of keywords, providing the list to the author, and receiving an approval of the list from the author, goes on to state that the claimed steps are obvious because presenting the ranked list of keywords to the author is the same as presenting the final version of the article to the author (as taught by Pope).

The Final Action fails to show how these two separate ideas (and separate claims) are the same. The Final Action further fails to show any suggestion derived from the references that

teach or disclose the claimed steps. The Final Action further fails to demonstrate any motivation to modify Pope's teaching of author approval for the final version of the article to provide for author approval of a ranked list of keywords. Thus, it seems that as in the *In re Ban* case, the examiner's reading of what is taught or suggested in Pope appears to be based on hindsight gleaned from the benefit of reading Appellants' disclosure rather than on the fair teachings of the reference. Therefore, Appellants respectfully request that the rejection of claim 4 be reversed.

D. Whether claim 16 is patentable under 35 U.S.C. 103 over the combination of (1) Pope; (2) Maddison; (3) Mathews; (4) Kao; (5) Sumner; (6) Walker; (7) Borovoy; and (8) Sato.

Claim 16 further limits the searching the database step of independent claim 9 and requires that the title and text of the article are parsed to generate a list of keywords, that the list of keywords is ranked according to their relative weight in describing the content of the article, and that the database is searched to generate a list of qualified reviewers.

The Final Action cites Sumner as implying "the step of parsing the article, such as the title, abstract, and text content to find [the] article's keywords for matching the reviewer records." Specifically, Sumner states:

> Currently, we are witnessing the beginnings of a shift from paper to digital media in the submission, review and publication of scholarly work. In many journals, it is now standard procedure for reviews and submissions to be transmitted electronically. Sometimes, automated systems are in place for matching reviewers with submissions based on keyword analysis. In a few cases, the final version is even published electronically as a set of HTML files available on the WWW.
> ***Sumner, Page 2, Lines 4 – 9.***

A review of the passage shows that Sumner expressly teaches that automated systems are in place for matching reviewers with submissions based on keyword analysis. What Sumner does not expressly teach or disclose is how the keywords are generated. Sumner does not teach or suggest that the keywords are generated by parsing the title and text of the article, as required by claim 16. At best, Sumner is silent as to parsing the title and text of the article to generate a list of keywords.

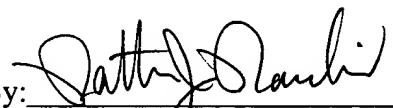
Ex parte Sarallo and *Ex parte Ban* are applicable here because this claim element is not expressly taught or fairly suggested by Sumner. The reference is at best silent. Accordingly, any reading of Sumner by Board that it teaches or suggests parsing the title and text of the article to generate a list of keywords would be speculation, which the Board stated in *Ex parte Sarallo* that it would not do. Moreover, similar to *Ex parte Ban*, the position in the Final Action that Sumner, although silent, teaches this step suggests that the examiner's reading of Sumner is based on hindsight gleaned from reading the Appellants disclosure rather than on the fair teachings of the reference. Accordingly, Appellants respectfully request that that the Board refrain from speculation and hindsight here and that the rejection of claim 16 be reversed.

Conclusion

Appellants assert that the tenuous seven (7) way obviousness rejection of independent claims 1 and 9 fail to make a prima facia case of obviousness because no motivation to combine the references has been identified in the Final Action. Additionally, the rejections of the claimed elements as set forth in the Final Action fail to teach the elements that are claimed by Appellants. In particular, the references are silent as to the claimed elements and would require speculation to be read on Appellants' claimed steps. Finally, the readings of the references as set forth in the reasoning for the rejections in the Final Action seem to be impermissibly based on hindsight gleaned from the examiner's knowledge and reading of Appellants disclosure rather than on the fair teachings of the references. Appellants therefore assert that all pending claims are currently in condition for allowance and that the rejections set forth in the Final Action should be reversed by the Board.

Respectfully submitted,
Procopio, Cory, Hargreaves & Savitch LLP

Dated: September 18, 2003

By: 
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(9) Appendix

1. (Twice Amended) A computer implemented method for peer review over a communications network, comprising:

receiving an article from an author via a communications network;

extracting context information from the article;

querying a database containing profiles of potential reviewers to determine a qualified reviewer based on the extracted context information;

assigning the qualified reviewer to the article;

providing an evaluation form to the reviewer;

receiving a completed evaluation form from the reviewer;

providing the completed evaluation form to the author;

receiving a response from the author directly in the completed evaluation form;

providing the completed evaluation form with author responses to an editor;

receiving a publication decision from the editor; and

providing the publication decision to the author and the reviewer.

2. Canceled.

3. (Amended) The method of claim 1 whereby the qualified reviewer is determined according to availability and past performance, including timeliness, thoroughness, clarity, and the number of completed reviews.

4. (Amended) The method of claim 3 whereby the receiving an article step further comprises:

generating a ranked list of keywords related to the article;

providing the list of keywords to the author; and

receiving an approval of the ranked list from the author.

5. (Amended) The method of claim 1 whereby the receiving a completed evaluation form step further comprises:

receiving comments entered directly into the evaluation form.

6. (Amended) The method of claim 1 whereby the receiving an article step further comprises:

automatically reformatting the article into a standard format; and

presenting the reformatted article to the author for approval.

7. Canceled.

8. (Amended) The method of claim 1 whereby the providing the publication decision step further comprises:

informing the author of the publication decision by email.

9. (Twice Amended) A computer implemented method for peer review over a communications network, comprising:

receiving an article from an author via a communications network;

extracting context information from the article;

querying a database containing profiles of potential reviewers to determine a plurality of qualified reviewers based on the extracted context information;

ranking the plurality of qualified reviewers;

contacting each qualified reviewer and requesting that the qualified reviewer agree to review the article;

receiving an agreement from one or more qualified reviewers;

providing the article to an accepting qualified reviewer;

providing an evaluation form to the accepting qualified reviewer;

receiving a completed evaluation form from the accepting qualified reviewer;

providing the author with the completed evaluation form;

receiving a response from the author directly in the completed evaluation form;

providing the completed evaluation form with author responses to an editor;

receiving a publication decision from the editor; and

providing the publication decision to the author and the reviewer.

10. (Amended) The method of claim 9 whereby the accepting qualified reviewers complete the evaluation form online.

11. (Amended) The method of claim 10 whereby each accepting qualified reviewer for an article has access to completed evaluation forms of other accepting qualified reviewers after submitting an evaluation form for the same article.

12. (Amended) The method of claim 11 whereby each accepting qualified reviewer can set access privileges for a section of the reviewer's completed evaluation form.

13. Canceled.

14. Canceled.

15. (Amended) The method of claim 9 whereby the receiving an article step further comprises:
reformatting the article into a standard format.

16. (Amended) The method of claim 9 whereby the searching a database step further comprises:
parsing the title and text of the article to generate a list of keywords;
ranking the list of keywords according to their relative weight in describing the content of the article; and
searching the database to generate a list of qualified reviewers.

17. Canceled.

18. Canceled.

19. (Amended) The method of claim 9 whereby the article iterates through the peer review process until the article is approved for publication.

20. (Amended) The method of claim 19 whereby after the article has been approved for publication, further comprising:
creating a galley proof of the article;
providing the galley proof to the author and editor;
receiving an approval of the galley proof from the author and editor; and
immediately publishing the article in an electronic format.

21. Canceled.

22. Canceled.

23. (Amended) The method of claim 9 whereby a group of authors collaborate to co-author an article, further comprising:

receiving a co-authored article via a communications network.

24. (Amended) The method of claim 23, further comprising:

receiving a response from each co-author directly in the completed evaluation form.

EXHIBIT A

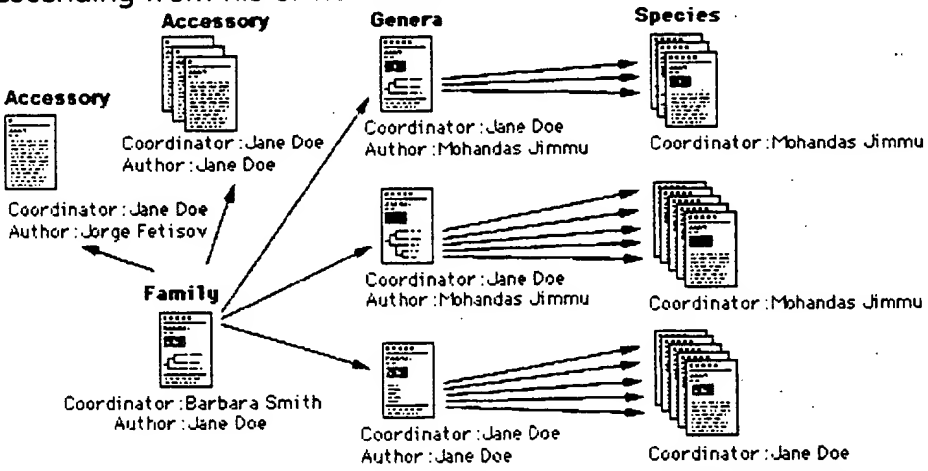
Peer Review

Peer-review, the critical evaluation of manuscripts by professional colleagues, is the traditional method of quality control in science. In order to improve the overall quality of contributions and to increase the involvement of the scientific community in the continuing development of the project, the Tree of Life now implements a formal peer-review system. Currently, there are only a few peer-reviewed pages on the Tree, but their number is steadily increasing.

On this page, you will find information on the following topics:

Peer Review and the Structure of the Tree of Life Project

Contributions to the Tree of Life are usually by invitation from a coordinator. Coordinators are themselves usually authors of the basal pages for a given group, i.e., each author of a Tree of Life page serves as the coordinator for the pages descending from his or her clade:



Coordinators help choose people to author and coordinate subgroups, and they serve as Associate Editors for this particular section of the Tree. Thus, the project currently functions more as a multi-chapter book, with authors chosen by the editors and associate editors, and less as a scientific journal, with submitted papers.

Pages on the Tree vary in their degree of completeness, from skeletal pages serving as links between complete pages, to complete pages that have been peer-reviewed. More discussion of levels of completeness can be found on the page Quality Assurance.

By soliciting the critical input of independent peer-reviewers, we hope to move closer to our goal of ensuring that each Tree of Life page provides a comprehensive, balanced synthesis of the current views about a given group of organisms, including the phylogeny of the group. We plan to have each contribution to the Tree of Life will go through peer-review eventually, but preliminary drafts of pages are usually connected to the Tree before the definitive, peer-reviewed version is ready to be published. Since the review process is labor-intensive and time-consuming, there may be considerable delays between the first appearance of a page on the Tree and its final acceptance as a peer-reviewed contribution. Should the page be rejected, it may remain on the Tree as a temporary page, marked with the "Under Construction" icon.

Only those pages that are labelled with a peer-review icon 

have successfully completed the review process.
Once a page has successfully completed the peer-review process, that and all subsequent versions will be archived, and access will be provided to these previous versions.

The Peer-Review Process

The Tree of Life peer-review works similar to the procedure adopted by many scientific journals. Pages that are to undergo peer-review are submitted to two to three independent subject area specialists. Reviewers are chosen by the editor-in-chief (David Maddison) in consultation with the associate editors (i.e., coordinators) of a given group. The major criterion for the selection of potential reviewers is their scholarly expertise as demonstrated by their publication record on the organisms represented on the page to be reviewed. The reviews are administered under the system of one-sided anonymity, i.e., reviewers are provided with the names of the authors, but authors are not told the identities of the reviewers; reviewers do, however, have the option of revealing their identity to the authors, if they wish to do so.

Reviews are usually conducted on-line, with the reviewer typing comments about individual sections of a contribution into the windows of a structured evaluation form provided on a special peer-review web page. An explicit definition of the review criteria is given on a linked page, Notes for Reviewers, which summarizes our guidelines for the design and content of contributions to the Tree of Life.

Reviewers are expected base their recommendation as to a page's acceptance or rejection on a thorough examination of the submitted material. If a page is deemed acceptable, reviewers have the option of requesting either major or minor revisions that would improve the page's content.

The comments furnished by the reviewers are passed along to the authors. If the reviewers recommend that a contribution be revised, the authors are asked to amend the page and resubmit it to the editor. Authors may at this point decline to make the requested changes, but they would be expected to support their opinion with plausible arguments. Any such explanation would first be considered by the editor-in-chief in consultation with associate editors, but it might also be forwarded to the reviewers for further comment. In the event of contradictory evaluations by reviewers or of disagreement between reviewers and authors, additional reviewers may be engaged. A Tree of Life page is awarded the peer-review mark 

once authors have made all the changes and additions required by the editor on the basis of the reviewers' recommendations. If the peer-review process results in a rejection of a contribution, the version of the page on the Tree of Life will return to a preliminary status, and we will initiate a search for new authors for this page.

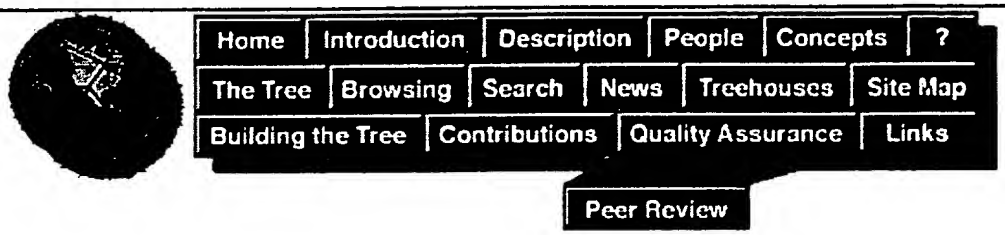


EXHIBIT B


Fifth International World Wide Web Conference
May 6-10, 1996, Paris, France

Electronic Management of the Peer Review Process

G. Jason Mathews and Barry E. Jacobs

Abstract

This paper deals with managing the peer review process with an electronic management system (EMS). Our approach uses a WWW-based interface to an Oracle database. We describe different aspects of the EMS, namely the peer review process, report generation, and security. An experimental peer review system was developed for the Fourth International World Wide Web (WWW) Conference, which provided a model to automate the underlying processes that had been driven primarily by pen and paper. This system uses the very technology that the International WWW Conference Committee (IW3C2) promotes, so it is fitting that the conference be automated with a WWW-based system. The experimental system has evolved with the help of many suggestions to provide better support for the WWW5 conference as well. This paper discusses the first experimental system, some lessons learned, and the second more evolved system for the WWW5 conference with emphasis on the latter.

Keywords:

Peer review, Electronic management system, CGI, Oracle, database, SQL

Contents

Introduction

This paper addresses the *electronic peer review process problem*. Namely, how does one electronically manage the complex process of peer reviewing papers over a physically distributed set of participants (i.e., authors, reviewers, and administrators). The peer review of papers submitted to the International World Wide Web (WWW) Conference Committee (IW3C2) would serve as an example of this process.

The peer review process (also called refereeing) can be thought of as a logistical problem that is relatively simple in concept. The peer review committee gets submissions, categorizes them, sends them to reviewers, collects reviews, makes final selections, and notifies submitters of the outcome. The process, however, gets complex in the implementation because of the scale involved and the geographic diversity of the program participants. There are several related activities in the literature [1, 2, 3].

Our solution to electronically managing the peer review process applies the methodology called Electronic Management Systems (EMS). In particular, we represent the entire peer review process as a virtual organization that uses the Web as a communications vehicle. The menus of the Web pages represent electronic processes with examples such as peer review processes and user management processes. Key components of EMSs are forms, report tools, and databases.

Many EMSs have been implemented by the National Aeronautics and Space Administration (NASA) to provide a "paperless" capability [4] that facilitates the operation of complex processes, such as the peer review process. Two such systems handled the peer review processes of the Fourth and Fifth International WWW Conferences (WWW4 [5] and WWW5 [6]) that accepted papers worldwide and allowed the conference committee members and reviewers to examine and evaluate them from a WWW forms-based interface to an Oracle Relational

Database Management System (RDBMS). There are also related research projects that have developed WWW interfaces to Oracle [7, 8].

The approach taken in developing these systems extends the electronic peer review process research in several ways. First, the development of the entire system requires little or no programming. Second, this is the first totally Web-based approach for modeling the complete peer review process. Third, we represent all the subprocesses of the processes in terms of HTML forms and report tools on databases. Fourth, we provide a common set of report tools dynamically generated from database schema that will work for "all" databases, hence, processes.

The Electronic Management System

The conference peer review EMSs (WWW4 EMS and WWW5 EMS) were designed for three types of users: 1) authors who submit their paper to the conference; 2) reviewers who submit evaluations of papers assigned to them; and 3) conference committee members who assign papers to reviewers and make the decision to accept or reject a paper.

The WWW4 EMS and WWW5 EMS are similarly designed, however, the WWW5 EMS reorganized the processes in a more intuitive layout. Throughout this paper the term "EMS" will generally refer to both systems except when indicated otherwise.

The EMS is a collection of hyperlinked menus, sub-menus, and forms that traverse a hierarchy of functions belonging to steps that define a process. Under this top layer is a relational database of four tables (submissions, assignments, users, and suggestions), and an assortment of Common Gateway Interface (CGI) scripts and auxiliary programs that access the database. The top-level menu structure of the EMS provides links to the following processes of the system:

Overview

An overview HTML document is provided at each level of the menu hierarchy to give an overview of the available process steps and options.

Bulletin Board

The Bulletin Board provides quick access and communication of information. For example, from the Bulletin Board page there is a menu item that links to the *Reviewers Bulletin Board* and another to the *Administrator Bulletin Board*. The purpose of the Reviewers Bulletin Board is to provide a user interface to reviewer information and on-line forms to enter evaluations. The purpose of the Administrator Bulletin Board is to provide a user interface to forms and information about the entire system, which is edited by the administrators for a hotlist of links into various parts of the system.

Peer Review Processes

The Peer Review Processes provide a facility for managing all of the peer review processes of the conference, which is discussed in detail later.

Users/Internal Staff Processes

The users menu allows the administrator to create new users and update/delete existing users. The users include administrators (EMS staff and conference committee members) and reviewers. Associated with every user is a user name and password through which the httpd server authenticates the user for various functions of the system. Thus, reviewers can enter only reviews of papers assigned to them; the administrator can access all the data; and people without authorization (no user name or password) can use only the public access forms to submit a paper.

Suggestions Processes

The Suggestions Processes provide a facility for processing and tracking suggestions for improvement from its users. The menu provides an on-line form for users to enter suggestions and comments about the EMS, and another on-line form for administrators to respond to the suggestions.

Report Tools

The Report Tools provide a facility for making available tools for generating reports across all the databases corresponding to all the above processes. Each level of the EMS provides a collection of report tools that report on the associated database with that level. For example, the report tools submenu at the Users/Internal Staff Processes menu provides a report of all users of the system (including user ID, full name, and E-mail address), which is an embedded Structured Query Language (SQL) statement as input to a CGI program that queries the Oracle database and formats the output in HTML.

Peer Review Processes

In this section we discuss the peer review processes, which represent the largest and most important part of the system. These processes involve soliciting potential authors for submissions and managing the incoming submissions as well as the evaluations of them. These aspects are classified as Initiation, Review, Rankings and Selections, Announcements and Debriefings where each process is further defined with the following subprocesses:

1. **Initiation**
   Call for Papers
   Intent to Submit
   Submissions Upload

2. **Submission Review**
   Examination of Submissions
   Assignment of Submission Responsibilities to Reviewers
   Submission Reviews

3. **Rankings and Selections**
   Topic Rankings
   Submission Selections

4. **Announcements and Debriefings**
   Bulletin Board Upload
   Posting Notifications of Selections

1. Initiation

Call for Papers and Intent to Submit

After the conference committee announces the call for papers, authors are invited to fill in an intent-to-submit form that, when submitted to the server, executes a CGI script that assigns a unique paper ID number to the prospective author and sends mail to the author with this number as well as instructions for submitting a paper to the conference. This information is also used early in the process by the conference committee to assign papers to reviewers based on the proposed paper title and topic.

Submissions Upload

The authors write their papers, mark them up in HTML under the guidelines of the conference, and archive their papers into single file archives using tar, PKZIP, or the equivalent program on their platform. The papers are uploaded as binary files to the system via File Transfer Protocol (FTP) and are processed when a CGI script is submitted. The author connects to the conference FTP server via an FTP client and puts the submitted file into the specified incoming directory. The incoming directory is write-only and allows authors to write files only but not to read other uploaded unprocessed submissions as some submissions may contain proprietary information not yet released to the general public. An author then registers the submission with an HTML form in which the user enters information about the paper (submission ID number, title, conference topic, related keywords, uploaded file name) and the authors (name, E-mail address, mailing address, telephone, etc.). When the form is submitted to the server, the corresponding CGI script validates the information and if valid will perform the following steps:

1. Move the uploaded file from the FTP incoming directory to the processed area.
2. Insert the author's profile (name, E-mail address, paper title, conference topic) into the submissions database table.
3. Display a confirmation message as HTML output displayed on the client's WWW browser.
4. E-mail the confirmation back to the author's specified E-mail address for the author's records.

Problems with the Submissions Process

These few steps introduced the first area of problems in that the instructions were not sufficiently clear and as a result authors inadvertently uploaded incomplete or corrupted submissions into the system. The first problem occurred during the transmission of the author's submission file to the server via FTP. One author was unable to connect to the FTP server because of an impossibly slow

band-width transmission between the United States and the author's local network connection in Europe. This author had to UUENCODE the submission (i.e., convert the binary file to ASCII) and use E-mail to submit it. Several other authors uploaded their submissions (probably from a Macintosh or PC) and transferred the files using FTP in ASCII mode, a process that translated carriage return and line-feed characters, resulting in a corrupted archive. Some authors submitted a multifile HTML document created using *LaTeX2HTML* [9], which made it difficult for a reviewer to view or print the entire paper quickly. Other authors submitted multiple files (no archive) where it was not apparent which files belonged together. Furthermore, some of the submissions did not comply to the HTML 2.0 standard, so some browsers viewed them differently and other submissions had links to files that worked on the author's Web server, MS-Windows for example, but did not work under the UNIX server hosting the EMS, which has a case-sensitive file system and the file referenced as the HTML inline image in <IMG SRC="figure1.gif"> differs from the file referenced in <IMG SRC="FIGURE1.GIF">.

The next problem occurred when submissions were uploaded to the system correctly but were left unprocessed when the author neglected to submit the final HTML form to acknowledge upload, trigger the CGI script to enter the submission information into the database, and move the submission into the processed area for reviewing to commence. Without this final step the submission does not exist in the eyes of the reviewer. There needs to be a better mechanism that integrates safe and anonymous FTP with the WWW to upload files, where authors enter file names on their local computer systems via a file dialog and the WWW browser uploads the files to the server. It appears that Netscape is addressing this problem with its new Netscape Navigator 2.0 browser with the added "file" input type for HTTP file upload, but it will not be supported from all browsers and a solution across all browsers must be found.

Some of these problems resulted from the conference committee not anticipating **ALL** the possible ways to upload a file, multiple file formats, HTML layouts, etc., while others resulted from authors not following the instructions. With an electronic layer between the reviewers, authors, and conference committee, it is not always clear to provide all information necessary for every situation especially when people may make assumptions of what is expected of them and others. A simple user interface and a clear set of instructions are best with extenuating circumstances handled on a case-by-case basis with correspondence between the author and conference committee. The author's interface to the EMS has changed little between the Fourth and Fifth WWW Conferences, but the author's instructions and the underlying CGI scripts have changed a great deal. The original instructions for WWW4 were about two printed pages in length while the revised instructions for WWW5 amounts to five printed pages outlining each step with troubleshooting information. With each iteration of the WWW Conference Series and the growth of the underlying WWW infrastructure (HTTP,

HTML, servers, and browsers), all of these problems are being handled quickly as we learn how to exploit this ever-changing medium.

2. Submission Review

Examination of Submissions

The administrator has the ability to preview the information entered about the submission and the paper itself before even assigning it to reviewers. For example, some submissions not meeting the acceptable guidelines may be deleted from the database and removed from further discussion, but this has yet to happen. There is access to the on-line papers from this level with a link to the top level directory containing the unpacked papers, each of which is located in a subdirectory corresponding to the submission ID number.

Assignment of Submission Responsibilities to Reviewers

Once the first set of papers is submitted, then the conference committee must decide which reviewer must evaluate it by matching papers to reviewers best able to evaluate them. There are several HTML forms from which to enter assignments by either managing the submissions for a particular reviewer or managing the reviewers for a given submission. There are report tools to generate various reports such as listing those submissions that have not been assigned to enough reviewers since every paper must be reviewed by at least two reviewers.

Submission Reviews

Once papers are assigned, reviewers will have access to these papers and be able to enter the grading information. The reviewer gets a list of papers, and when a paper is selected, an evaluation form is filled in with the information about that paper. The reviewer grades the paper according to several criteria (relevance, originality, correctness, and quality) on a scale from 1 to 5 where 1 is the poorest and 5 is the best score. In addition to these numeric scores the reviewer must also include private comments about the paper to understand later, for example, why relevance for a paper was a "4" and not a "5". These comments are important in the refereeing process to select borderline papers that may or may not be accepted. There is also a comments field to suggest modifications needed for the paper to be accepted, which are mailed to the author along with the scores. The committee may examine a single review or examine all reviews for a given paper to ensure that the scores between two reviewers do not differ by more than one point in which case the committee must confer with the reviewers to re-evaluate their decisions and bridge the gap between the scores.

The private comments and modifications to authors' comments were initially stored within the Oracle database assignments table, but problems surfaced owing to Oracle's limitations on string data types within SQL statements. A *VARCHAR2* datatype (a variable character type) cannot exceed 2,000 characters, and the reviewers entering long reviews (> 2,000 characters) resulted in some comments being truncated. The WWW5 EMS stores the comments in external ASCII files that are outside the Oracle database but

accessible from the EMS's forms interface as well as directly readable from the file system. Within the database the file name of the comments is stored and a special flag within the form triggers the CGI program to read the contents of the file and insert this into the form's *TEXTAREA* field for editing.

3. Rankings and Selections

Topic Rankings

In addition to scoring each paper there is another step to rank each paper within a given topic to help compare the papers and identify the best or poorest papers. For example, there were 18 papers submitted to WWW4 belonging to the *Authoring Environments* topic. Of these 18 papers only four papers were accepted and 14 were rejected, so if they were ordered from one to 18, then the top four could have been selected once the ranking was defined, but ranking the papers is more difficult than grading them. It requires not only deciding whether a paper is good or bad but also how it rates to all other papers within the topic. For a topic such as *Charging and Payment Protocols* with only three submissions, it may not be difficult, but for the *Authoring Environments* topic it would take too much time. Therefore, this recommended step in the peer review process is not always completed.

Submission Selections

After careful deliberation of the reviewers' evaluations (grades and comments) and topic rankings, the committee decides whether to accept or reject each submission.

4. Announcements and Debriefings

Bulletin Board Upload

This step provides instructions for the committee to generate a final report of the decisions to accept and reject papers based on the evaluations. The report is created from a predefined SQL statement, copied into the Bulletin Board area, and linked from the main Bulletin Board. From there all reviewers and committee members can examine this report to determine whether any last minute re-evaluation is needed for any particular submission.

Posting Notifications of Selections

This step provides instructions for the conference committee to gather the submission information and evaluations, compose debriefing letters of acceptance or rejection to the appropriate authors with the reasons for rejection or the needed modifications for a final revision of accepted papers, and electronically mail out the letters to the E-mail addresses of the designated authors. The authors of accepted papers are notified to submit final revision of their papers, which are uploaded in the same manner as the original paper through FTP followed by submitting a form to ingest it.

Each process step has a deadline and when the selections are mailed out and the final papers uploaded to the conference server, then the peer review process is officially over. Then the conference committee query the databases and use the report tools to generate various text or graphics reports on the submissions and

evaluations for analyzing what had happened and to improve the next conference. For example, some conference topics may not have been picked by any or just a few authors. This situation means that the topic may not be relevant to the community or the wording of it was not clear. For WWW4, the topic *Dealing with Imprecise, Uncertain or Inconsistent Data* was not selected by any authors, so this topic was subsequently dropped from the WWW5 topics.

CGI and the Underlying Database

The heart of the user interface is a "multifunction" form that interfaces with a CGI program for accessing the database. Each multifunction form provides a single interface to perform multiple database operations on a particular database table or view. The layout of the output and the internals of the database table are embedded within the HTML form, so each form may have different database tables with different columns, but the underlying CGI program serves all of the basic database operations from one executable to query the database, update existing records, and create new records. The form is a template that is read by the CGI script to format the output by filling in the corresponding fields in the form with the values from the database.

The interface provides the following seven basic database operations:

And-Search

This operation searches for all matches where all specified conditions are true (e.g., submission_id = "14" *and* user_id = "smith").

Or-Search

This operation searches for any matches that match the specified conditions (e.g., submission_id = "117" *or* user_id = "jones").

Key-Search

Entering the primary key of the table (e.g., submission_id for the submissions table or user_id for the users table) searches for that record and automatically fills in the form with values from that database record corresponding to the fields in the form. This function is useful when users know the primary key of a particular record.

Insert

Insert allows a new record to be added into the appropriate database. Unique primary keys must be specified in the appropriate fields otherwise an error will result; i.e., two papers cannot have the same submision ID number.

Update

Update modifies an existing record. A record should first be filled in from a search operation, the changes made to the appropriate fields, and then the update request is submitted to save the changes to the database.

Delete

Delete removes a record or records from the database that match the entered values. In most cases a user will search for a record, thus populate the form with the record, and then select delete to remove that entry. However, also possible is just entering the submission_id for a paper submission (being the primary key) and selecting the delete operation to remove that record without first filling in the

form. It is highly recommended that users preview any record before deleting it in case the wrong record is accidentally chosen.

Clear

Clear is not really a database operation, but it clears all information from the data entry areas in the current form and returns an empty form from which to enter a new search.

Each form will have all or a subset of these seven operations. A sample database query form is illustrated in Figure 1 with the corresponding HTML equivalent shown in Figure 2. Hidden within the HTML form are fields specifying what database is used (Oracle in this case, where Sybase is also supported), what is the form name, primary table, and other information to identify the database table. The column names of the database table are inserted into the form with the NAME tag using the syntax *column name.data type.database tablename*[*.optional flags*]. For example, the submission_id column name, which follows the "Paper ID #" text in the form, is a character type designated with the "c" data type from the submissions database table, and the flags "pm" indicate that it is a primary key (p) of the table and the value must be filled-in when modifying the database (m). This form is used as a template by the CGI program, which fills in the appropriate values depending on the HTML context. In the case of an INPUT element, the VALUE="" attribute is inserted into the form, and the value of the database replaces whatever text (if any) is between the double quotes. For a SELECT element such as the decision column at the bottom of the form, the SELECTED attribute is inserted into the OPTION element that matches the value in the database.

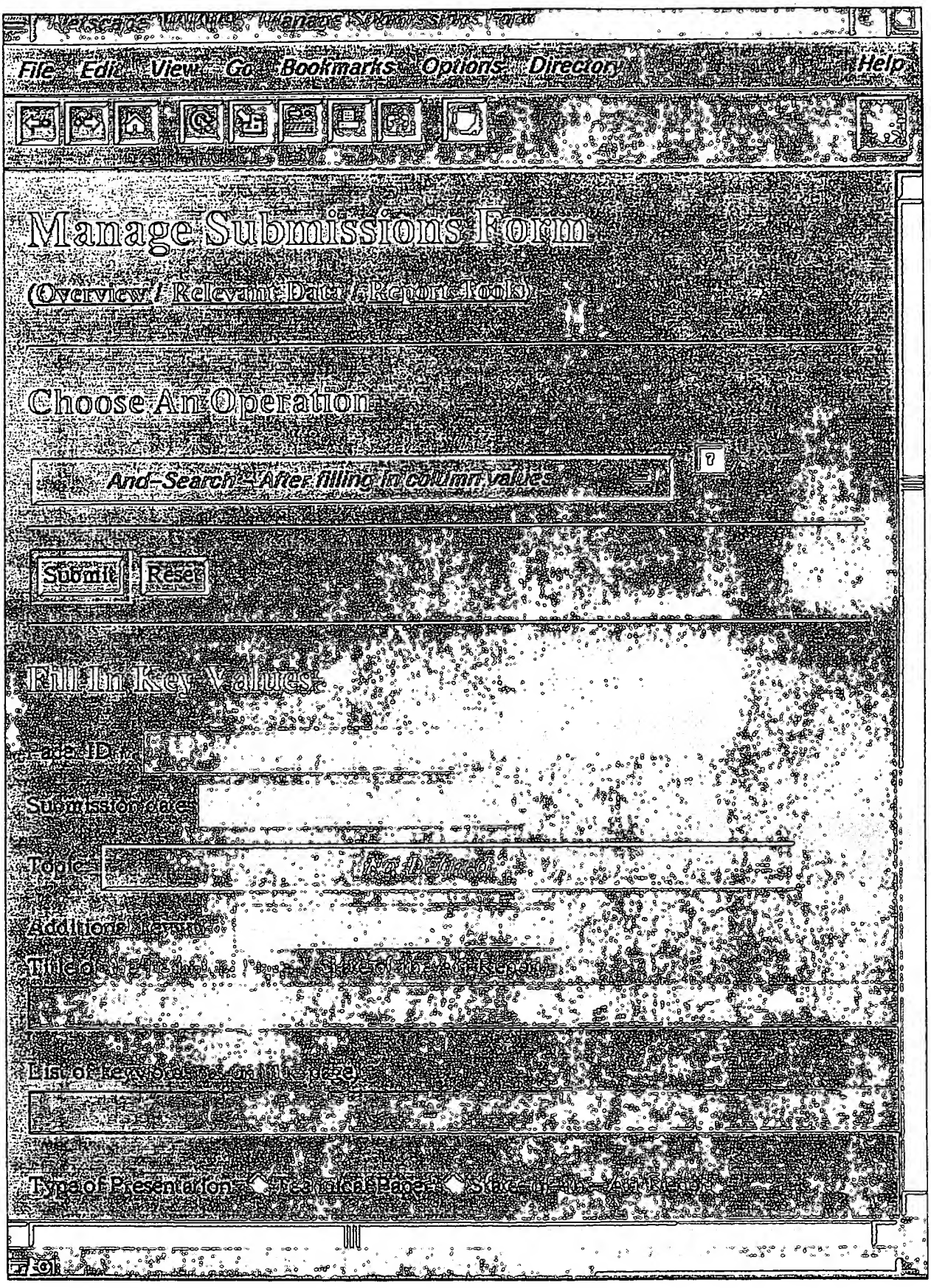

File Edit View Go Bookmarks Options Directory Help
Manage Submissions Form
(Overview / Relevant Data / Report Tools)
Choose An Operation
And-Search - After filling in column values
Submit
Reset
Fill In Key Values:
Paper ID:
Submission date:
Topic:
Additional keywords:
Title of Paper:
List of keywords (one per line):
Type of Presentation: Technical Paper Status of the Art Report

Figure 1: Sample query form for submissions

```
<HTML>
<HEAD>
<TITLE>WWW95: Manage Submissions Form</TITLE>
<BASE HREF="http://.../manage_submissions/">
</HEAD>
<BODY>
<H1>Manage Submissions Form</H1>
<H3>(<A HREF="Overview.html">Overview</A> /
<A HREF="Relevant_Data.html">Relevant Data</A> /
<A HREF="Report_Tools.html">Report Tools</A>)</H3>
<HR>
<FORM METHOD="POST" ACTION="/cgi-bin/dbtool.cgi">
<H2>Choose An Operation</H2>
<SELECT NAME="operation">
<OPTION VALUE="AND"> And-Search - After filling in column values
<OPTION VALUE="OR"> Or-Search - After filling in column values
<OPTION VALUE="KEY"> Key-Search - After filling in paper ID #
<OPTION VALUE="INSERT"> Create Submission - After filling in column values
<OPTION VALUE="UPDATE"> Update Submission - After changing appropriate values
<OPTION VALUE="DELETE"> Delete Submission - After filling in column values
<OPTION VALUE="CLEAR"> Clear Form - Clears all values
</SELECT> <A HREF="Instructions.html#operation"><IMG SRC="/Images/hlp_button.gif"
ALT="?"></A>
<HR>
<INPUT TYPE="submit" VALUE="Submit"> <INPUT TYPE="reset" VALUE="Reset">
<HR>
<H2>Fill In Key Values:</H2>
<INPUT TYPE="hidden" NAME="dbms" VALUE="oracle">
<INPUT TYPE="hidden" NAME="dbms_table_name" VALUE="submissions">
<INPUT TYPE="hidden" NAME="primary_table" VALUE="submissions">
<INPUT TYPE="hidden" NAME="form_name" VALUE="submissions_form.html">
Paper ID #: <INPUT name="submission_id.c.submissions.pm"><BR>
Submission date: <INPUT name="submission_date.d.submissions"><BR>
...
List of keywords (as on title page): <INPUT NAME="keywords.c.submissions"><BR>
<BR>
Type of Presentation: <INPUT TYPE="radio" NAME="type.c.submission.r" VALUE="P"> Technical
Paper
<INPUT TYPE="radio" NAME="type.c.submission.r" VALUE ="R"> State-of-the-Art Report
...
Decision: <SELECT NAME="decision.c.submissions">
<OPTION VALUE="NULL">Not defined
<OPTION VALUE="1">Accept
<OPTION VALUE="2">Reject
<OPTION VALUE="3">Propose as poster
</SELECT> <A HREF="Instructions.html#decision"><IMG SRC="/Images/hlp_button.gif"
ALT="?"></A>
</FORM>
</BODY>
</HTML>
```

Figure 2: HTML corresponding to the form in Figure 1

Searching the Database

Performing an *And-search* operation without selecting any values in the form will return all submissions (198 for WWW4 and 211 for WWW5). Entering the keyword as "database" for a search operation will match 14 submissions from the WWW4 EMS. The SQL statement generated for this operation is the following:

```
select unique submission_id, title from submissions
where upper(keywords) like upper('%database%');
```

This SQL statement will extract the submission_id and title fields for all entries from the submissions table such that the string "database" is contained within the keyword field. The output of this operation, formatted within an HTML form, is displayed in Figure 3 below.

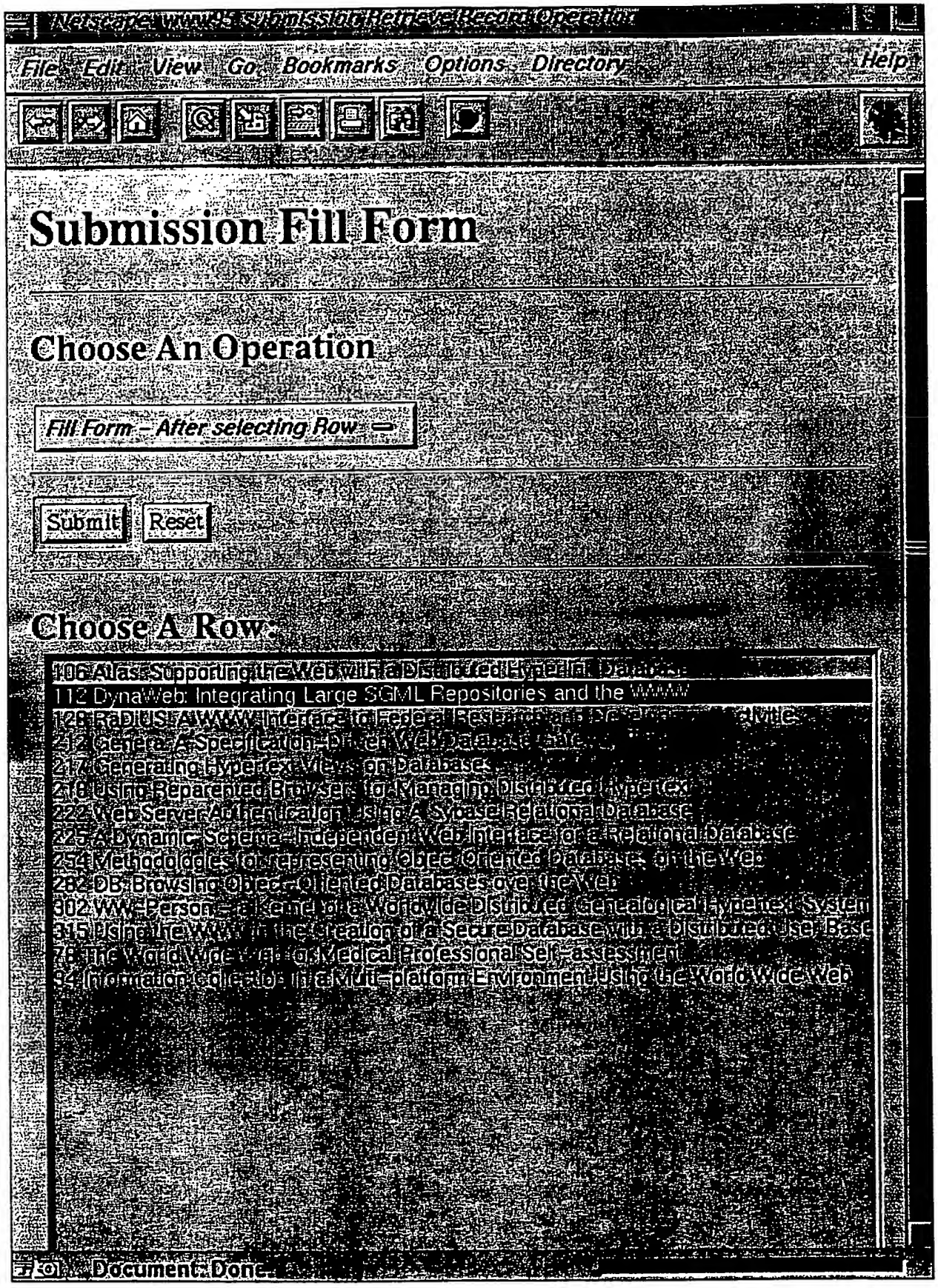

Netscape: www95 Submission Retrieve Record Operation
File Edit View Go Bookmarks Options Directory Help
Submission Fill Form
Choose An Operation
Fill Form – After selecting Row ⇨
Submit
Reset
Choose A Row:
106 Atlas: Supporting the Web with a Distributed Hypertext Database
112 DynaWeb: Integrating Large SGML Repositories and the WWW
126 RaDIUS: A WWW Interface to Federal Research and Development Studies
214 General Specification-Driven Web Database Gateway
217 Generating Hypertext Views on Databases
218 Using Reparented Browsers to Manage Distributed Hypertext
222 Web Server Authentication Using A Sybase Relational Database
225 A Dynamic Schema-Independent Web Interface for a Relational Database
254 Methodologies for Representing Object-Oriented Databases on the Web
282 DB: Browsing Object-Oriented Databases over the Web
302 WWW-Person: A Kernel for a Worldwide Distributed Genealogical Hypertext System
315 Using the WWW in the Creation of a Secure Database with a Distributed User Base
78 The World Wide Web as a Medical Professional Self-assessment
94 Information Collection in a Multi-platform Environment Using the World Wide Web
Document: Done

Figure 3: Search list of database related submissions
Selecting submission number 112 from the list above and pressing "submit" will query the database for that entry and fill in the form with the values of that entry as shown in Figure 4.

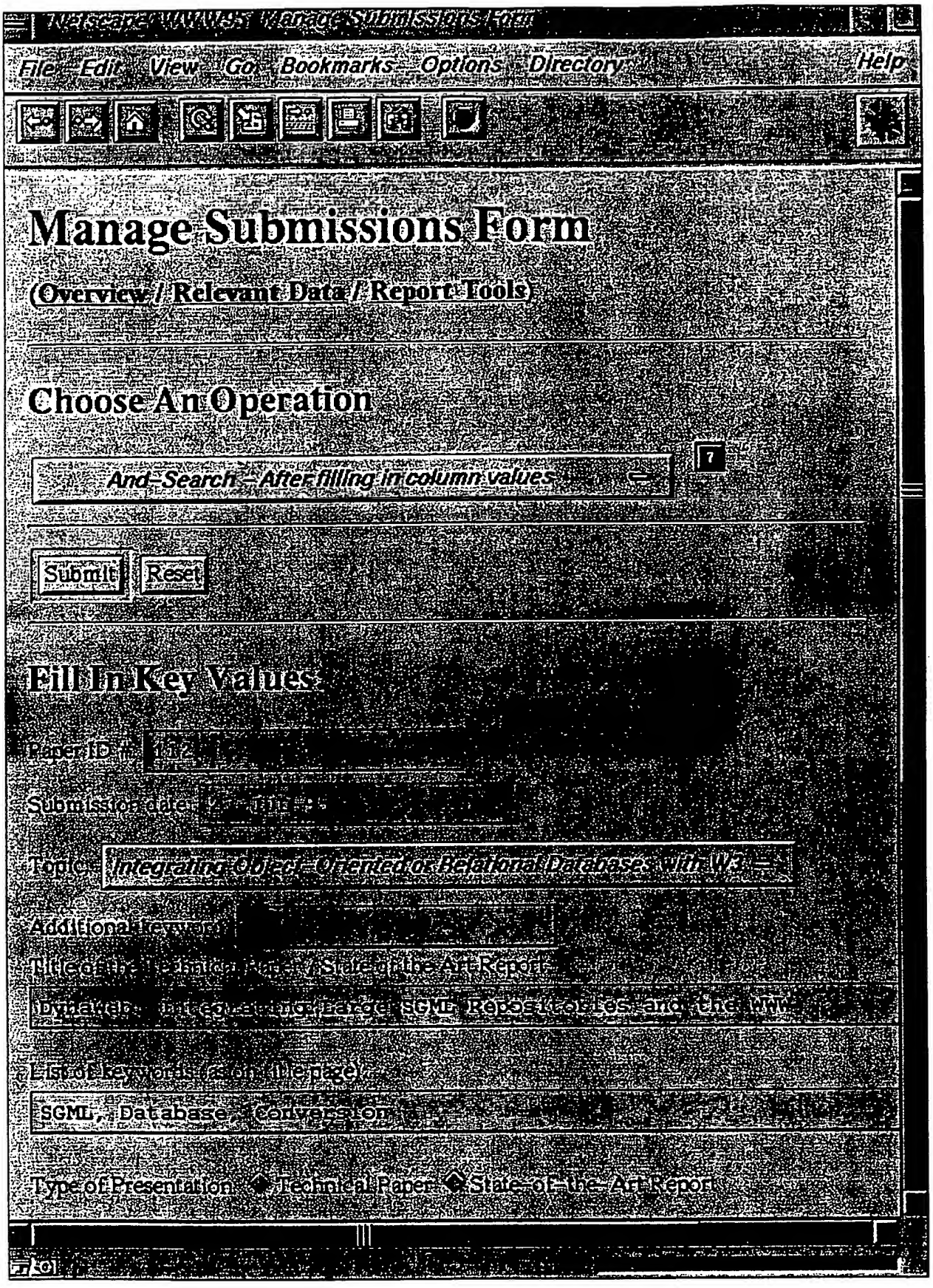

Netscape: WWW87 Manage Submissions Form
File Edit View Go Bookmarks Options Directory Help
Manage Submissions Form
(Overview / Relevant Data / Report Tools)
Choose An Operation
And-Search - After filling in column values
Submit
Reset
Fill In Key Values
Paper ID
Submission date
Topic
Integrating Object-Oriented or Relational Databases with W3
Additional keywords
Title of the Technical Paper / State-of-the-Art Report
Dynamic Integration of Large SGML Repositories and the WWW
List of keywords (as on title page)
SGML, Database, Conversion
Type of Presentation
Technical Paper
State-of-the-Art Report

Figure 4: Sample query form filled in for submission #112

Going back to the blank query form in Figure 1 and selecting the keyword as "database" and the overall decision as "accepted" with a numeric value of 1 will result in a list of two matches (submission number's 112 and 282). This operation will build the following SQL statement for matching both conditions:

```
select unique submission_id, title from submissions
where upper(keywords) like upper('%database%')
and decision = '1';
```

More advanced searches, for example, can query for any submissions with either *VRML* or *JAVA* in the list of keywords by selecting the *Or-Search* operation and entering the string "VRML, JAVA" into the keywords field. The comma operator delimits a list of keys or substrings that are added to the search parameters. Any combination of such searches can be entered.

Security and Authentication

Security is handled using basic user authentication (httpd, htaccess, htpasswd, htgroup) [10] where authorized users are assigned user names and passwords and must authenticate themselves with their user name and password before they are able to access protected forms or CGI scripts. Most users are designated as reviewers with limited access (update reviews, examine submissions, etc.), and some users are designated as administrators with access to the entire system and the ability to create new users. The .htgroup access file defines these two types of user groups: *www-admin* for administrators and *www-users* for normal users (i.e., reviewers). The forms that require administrator-only access have the appropriate .htaccess file specifying that only users from the *www-admin* group have access to that form. When creating a user on the system, not only does the users database table have to be updated with the user's ID, full name, E-mail address, and telephone number, but a corresponding entry for the user name and password must be maintained for the .htpasswd and .htgroup files for server authentication. The database query tool knows nothing of the password files, so within the Manage Users/Internal Staff form (a form to create users) is a hidden field that specifies an external CGI script to run after the database operation is executed, where in this case the same CGI input is passed to an update-user script that updates the server authentication files corresponding to the selected database operation (insert, update, or delete).

Report Tools for Analyzing the Data

As stated earlier, the report tools generate textual and graphical reports across the databases corresponding to the current level in the system's menu hierarchy. For example, the report tools at the *Examination of Submissions* menu provide reports on the submissions, and the report tools at the *Users/Internal Staff Processes* menu provide reports on the users of the system. Some examples of the output generated from the report tools are discussed in the Appendix. The report tools are divided into two classifications: standard report tools and ad hoc report tools.

Standard Report Tools

Standard report tools are specialized tools that generate pre-defined reports, all of which are created from embedded SQL statements and meta-information (database tables, primary keys, formatting/layout instructions) sent as input to a database report tool to access the Oracle database and format the output in dynamically generated HTML documents.

Ad Hoc Report Tools

The ad hoc report tools provide general tools that allow users to make up their own reports and queries. There are several types of ad hoc reports:

Row Reports provide tools that allow users to query databases and produce one-row-at-a-time reports. From a given query, a single row or record of the database is displayed in the filled-in form as in the example in Figure 4.

Tabular Reports provide tools that allow users to query databases and produce reports in tabular form as an ASCII file or a HTML 3.0 document with table definitions. One such tabular report is that in which a user enters a SQL statement to query the database directly.

Graphics Reports provide tools that allow users to query databases and produce reports with both graphics (e.g., bar plots, line plots, pie charts, surface plots) and tabular formats. The underlying software that generates the graphical plots is the Interactive Data Language (IDL) from which GIF images are dynamically created from the queried data. This process is described in more detail in an earlier paper [11] that provides a graphical interface to scientific data on the Web.

Conclusion

We have presented a description of the peer review process of the IW3C2 and how an electronic management system brings all the relevant information (papers, evaluations, and reports) together for quick access by the conference committee and reviewers from remote locations. This system provides a working solution to the electronic peer review problem. The EMS provides a model for automating complex processes where many people need to create and manage large amounts of information. A WWW-based interface was introduced that provides access to information stored in an Oracle database, and the hierarchy of process steps in a hypertext menu structure breaks down a complex set of processes into a manageable step-by-step list of operations.

Acknowledgments

Thanks to Michael Shillinger for his insight on the peer review process in general and Tim Berners-Lee for his insight on the peer review process of the IW3C2 in particular. Many thanks to the authors who submitted papers into the system for the WWW4 and WWW5 conferences and especially to the reviewers and committee members for using the system and evaluating all the papers. Portions of the EMS software were made available to NASA as-is by courtesy of Advanced

Applications Corporation (NAS5-38060), Grafikon Ltd. (NAS5-32507), and REI Systems (NAS5-31455).

References

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Appendix. Results of the WWW4 Peer Review Process

The following figures were generated as graphical reports from the WWW4 EMS after the peer review process was officially completed, which was on October 9, 1995 when the final versions of the papers were submitted.

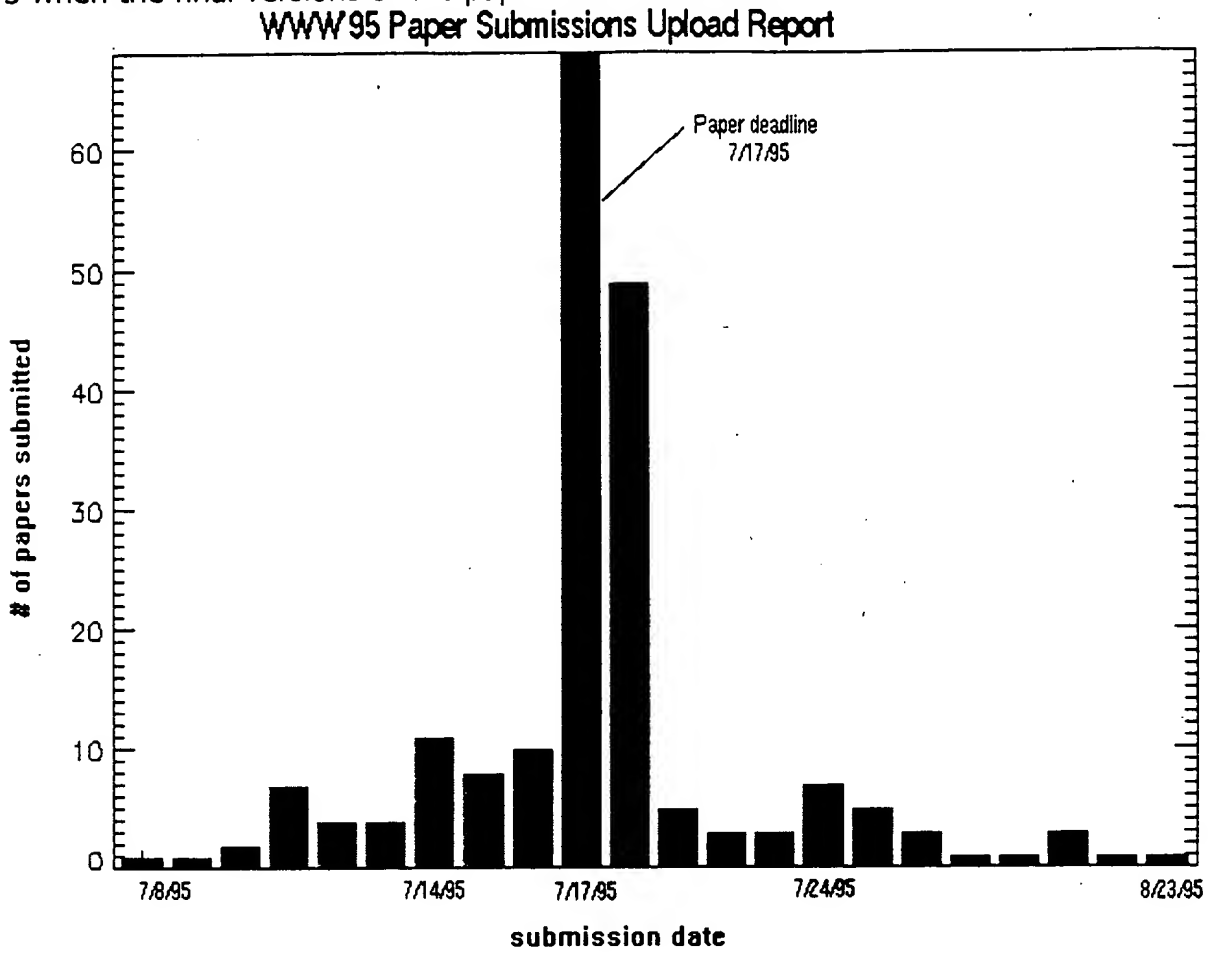

Figure 5: Number of papers uploaded by submission dates
The submission deadline was July 17, 1995. However, many papers were submitted late; in fact, nearly 45% of the papers were late. As many more papers are being submitted to each WWW Conference, there will be a need for a stricter policy on late papers with an absolute deadline where only exempted papers are permitted a late submission. Further analysis of the data shows that a greater percentage of the earlier submitted papers were accepted (46%) as opposed to the late papers (18%) since the reviewers had more time to review them.

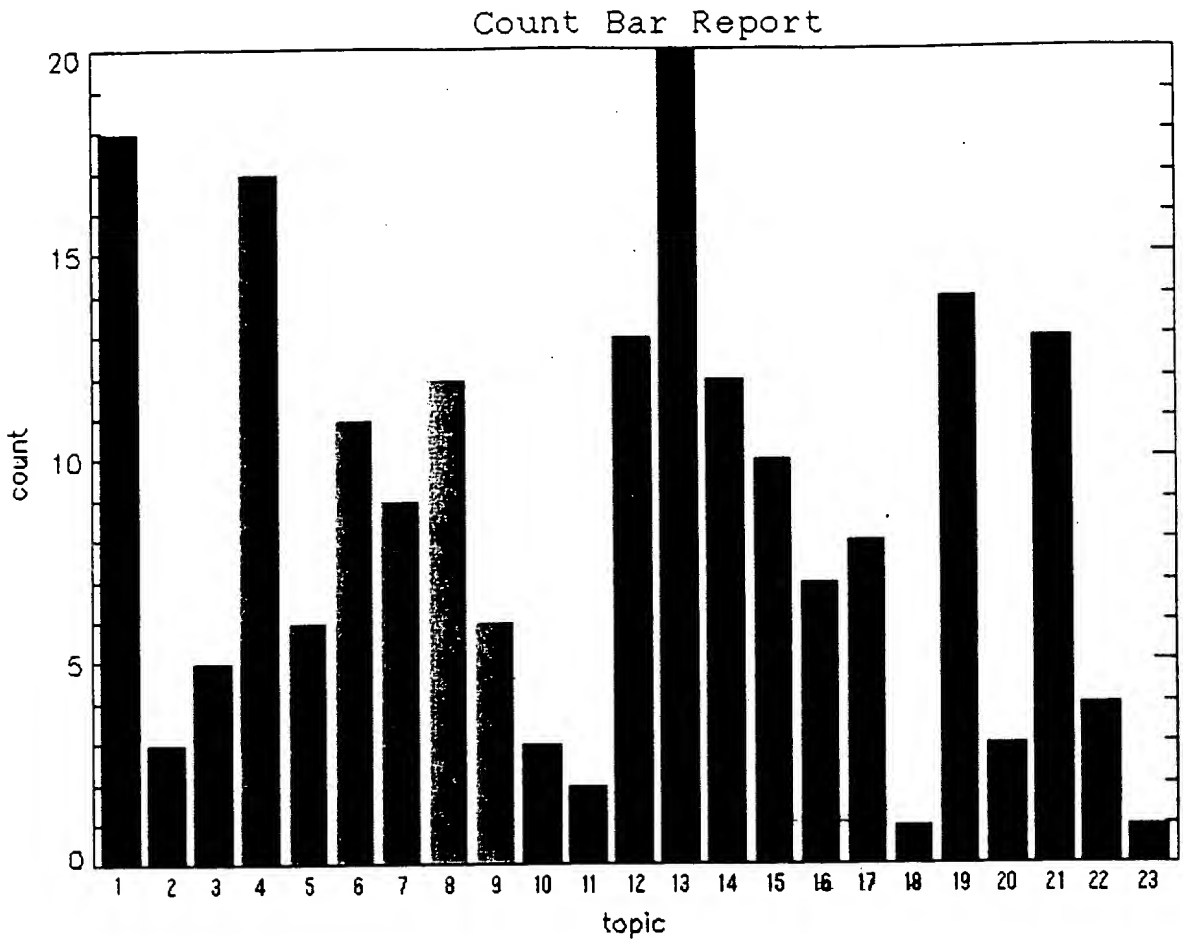

Figure 6: Number of papers per conference topic

The subjects covered by the papers were diverse with a reasonable distribution as shown in Figure 6 and is also in the following table:

1. Authoring Environments 18
2. Charging and Payment Protocols 3
3. Commercial Use 5
4. Computer-Based Training and Teaching 17
5. Consistency, Integrity and Security 6
6. Design Techniques for Web Applications 11
7. Information Representation & Modeling 9
8. Integrating Object-Oriented or Relational Databases with W3 12
9. Intelligent Search and Data Mining 6
10. Knowledge Representation in W3 3
11. Modeling Web Dynamics 2
12. New Applications 13
13. New Experimental, Commercial & Educational Systems 20
14. Other 12
15. Protocol Evolution and Extensions 10
16. Resource Discovery 7
17. Software for W3 Applications 8
18. Time, Event Management & Monitoring 1
19. Tools and Browsers 14
20. Tuning, Benchmarking & Performance 3

21. User & Application Interfaces 13
22. Virtual Reality in W3 4
23. Not Specified 1

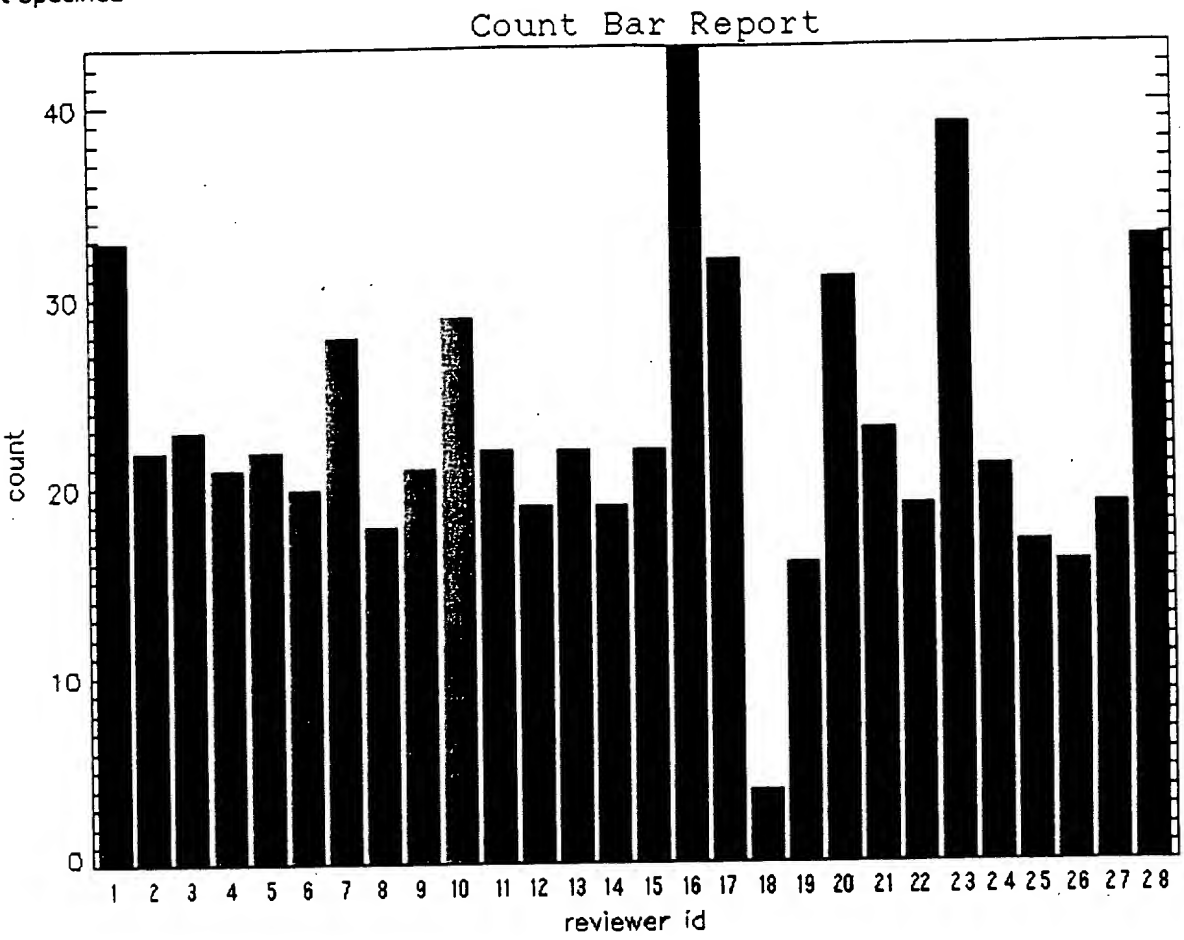

Figure 7: Number of reviews assigned to each reviewer
There were 28 reviewers for almost 200 papers with at least two reviewers for each paper, so many of them had to review over 20 papers apiece.

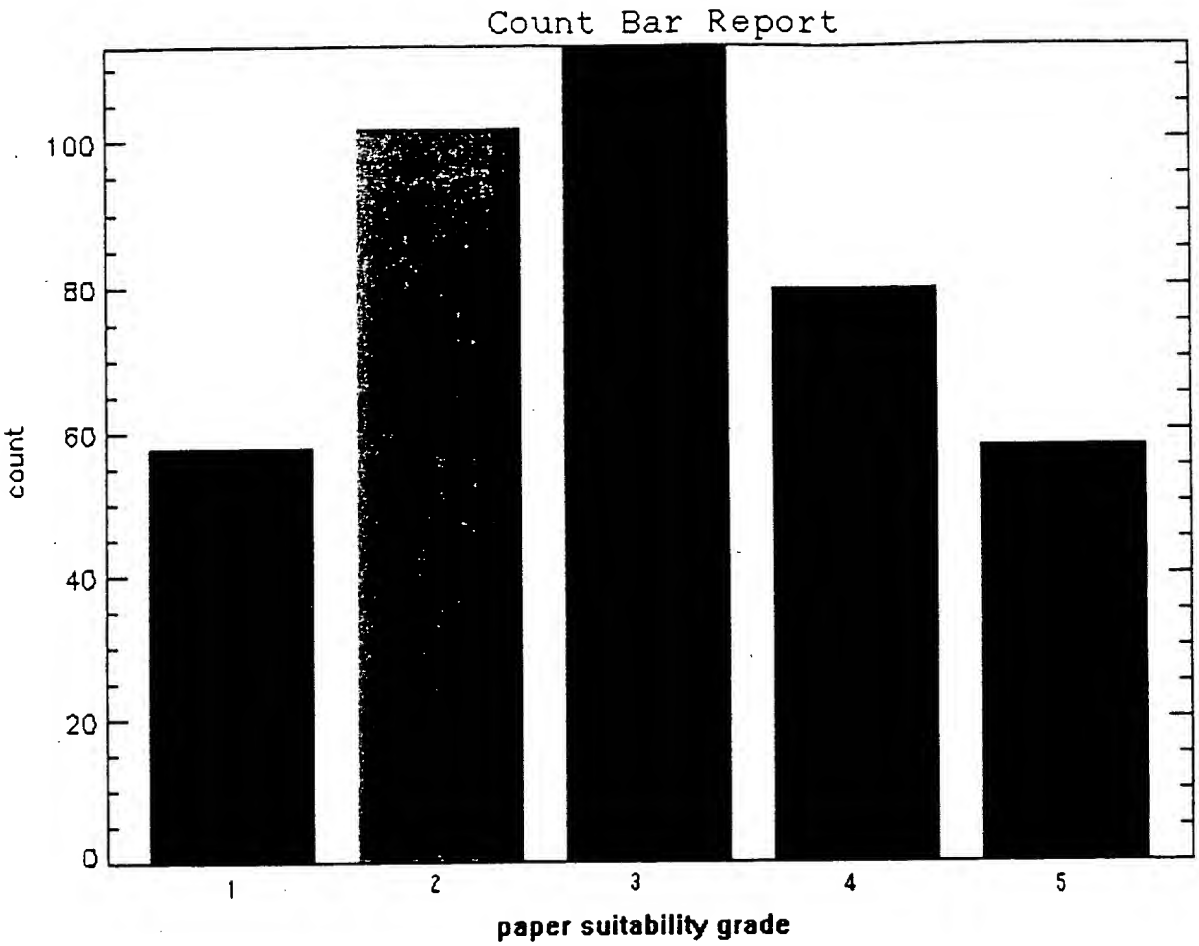

Figure 8: Counts of overall paper suitability score for all reviews
The grading of all the papers was fair with the expected bell-shaped curve with many papers receiving an average score (3) and fewer papers having a poor (1) or outstanding (5) score.

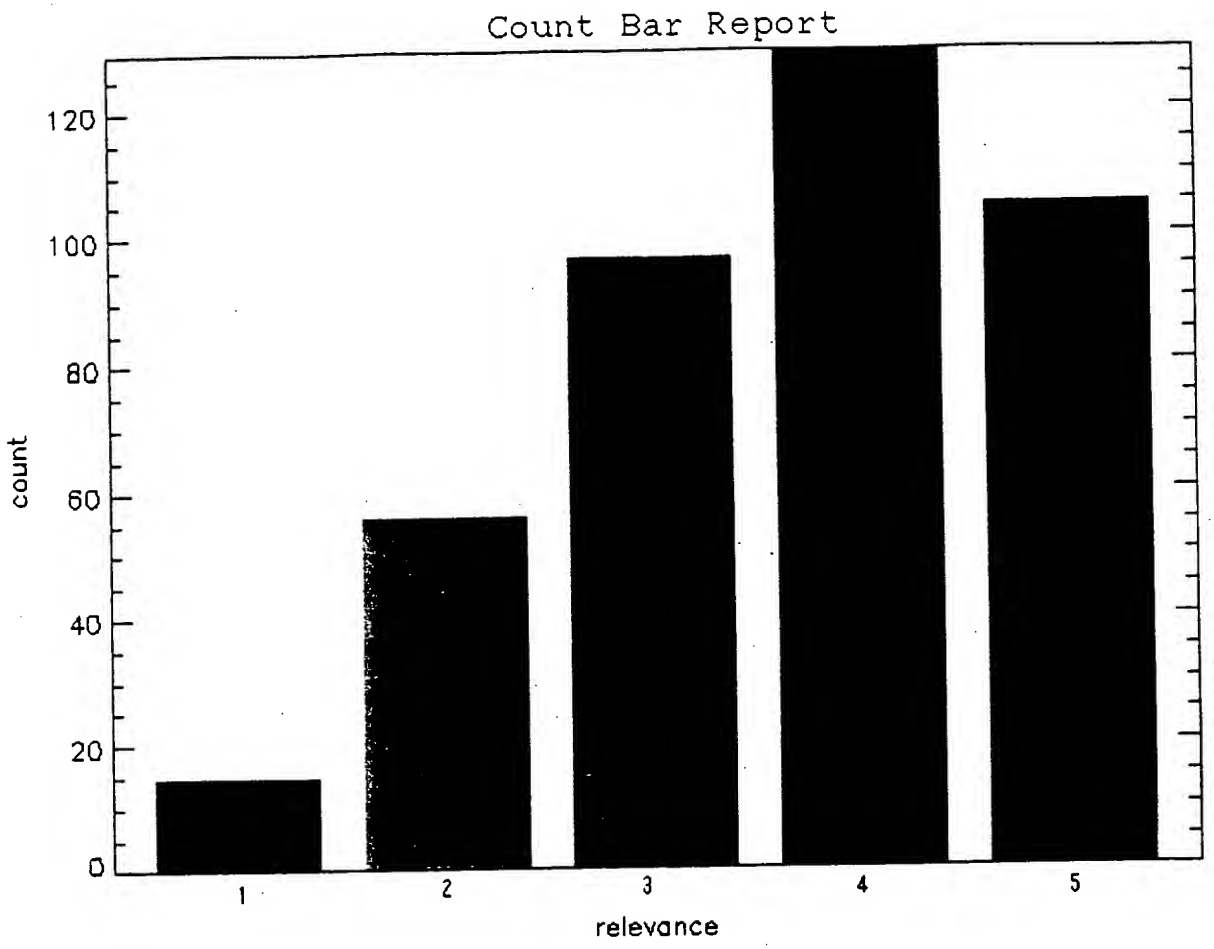

Figure 9: Count of relevance score for all reviews
The relevance grade asked the question of whether a paper works toward the goals of the conference where 1 is unrelated, 2 is somewhat related, 3 is of moderate importance, 4 is very important, and 5 is a topic of immediate importance to the Web. An interesting aspect of this graph is that most of the papers submitted were very important and relevant to both the WWW and the goals of the conference.

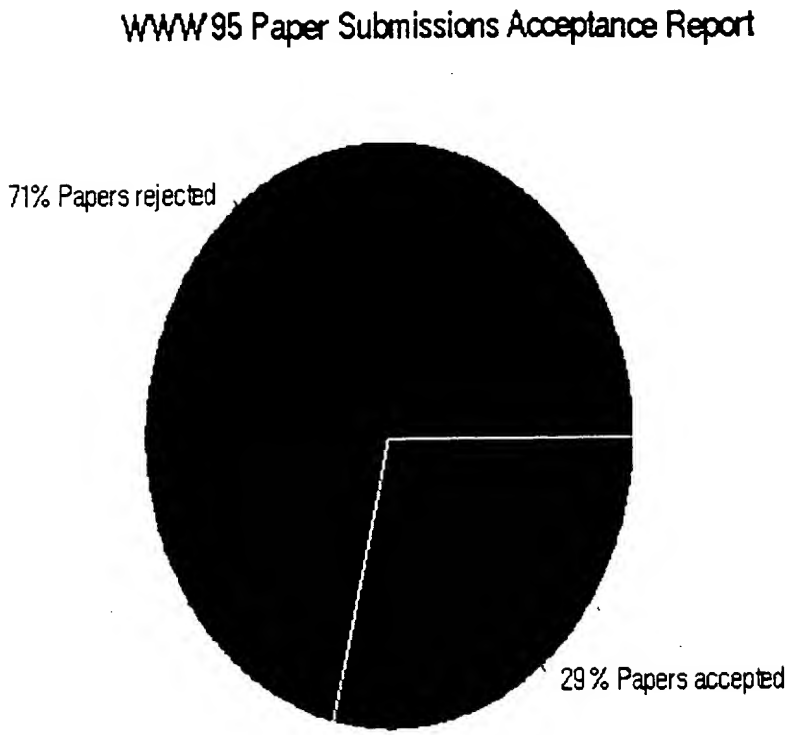

Figure 10: Number of accepted and rejected papers
An abundance of papers was submitted to the conference, and many good papers were rejected because only a select few can actually be presented at the conference. Only 57 papers (or 29%) were accepted while 141 were rejected. Many papers were alternatively presented in the Poster sessions, and for other authors the committee recommended they resubmit their papers at the next conference with the suggested changes.

About the Authors

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EXHIBIT C

CONSERVATION ECOLOGY

A peer-reviewed journal of integrative science and fundamental policy research

Using the web for peer review and publication of scientific journals

Learning by doing: the Conservation Ecology Project

Shealagh Pope & Lee Miller

September 1998

Please note that larger versions of all the graphics in this article can be obtained by clicking anywhere within a figure.

Introduction

We began the Conservation Ecology Project in 1993 to address, through the dissemination and multi-media potential of the Internet, issues of cost, speed, and access to research findings in a rapidly changing and growing discipline. We realised that electronic preparation of manuscripts and the pervasive use of the Internet for communication, particularly within the scientific community, made it possible to conduct the entire peer-review process on-line.

The Conservation Ecology Project capitalizes on this shift in the medium used for scientific communication from paper to electronic. It does so by automating the entire process of running a journal from submission through editing and review, to publication and distribution. That automation software has served as the editorial office for the on-line journal *Conservation Ecology* for over a year.

Brief history of the Project

We made the decision to publish on-line back in 1993. At that time, libraries were engaged in active triage to cut their expenditures and turnaround times were getting longer as journals accumulated accepted papers and deliberated over the tradeoffs between adding issues and pressure to keep subscription costs low. In 1993, on-line journals were either solely text or required the reader to possess an advanced computer degree to decipher the articles. Email, ftp, and gopher were the dominant interfaces to the internet, and the World

Wide Web was just starting to emerge. In 1993, many authors, editors, reviewers, and readers were limited to email access to the internet

Goals of the Conservation Ecology Project

The key goals in publishing on-line were:

- cost reduction
- shortening the turnaround time for reviewing and publishing manuscripts
- accessibility:
    - to non-academics - managers, NGO's, policy makers
    - world wide
    - platform independent

Traditionally, the cost and time savings highlighted for publishing on-line are the elimination of distribution costs and the reduction in time delays associated with collecting papers into an issue. However, these are not the only advantages that can accrue from the shift from a paper-based process to an electronically-based peer-review and publication system. In developing custom software to automate as much as possible of the submission, peer review, and publication processes, we have sought to realize additional cost and time benefits from the move "on-line".

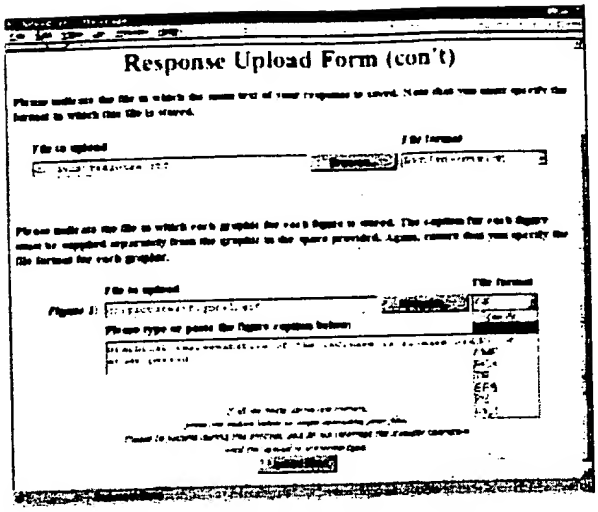
We've now published 3 issues of Conservation Ecology using the software. Over that period we have qamended and refined the functionality of our automated "editorial office". The system is now not only an encapsulation of the 17 years of publishing experience of my co-author, Lee Miller, former managing editor for the Ecological Society of America's print journals, but also of our accumulated experience in running a new on-line, peer-reviewed journal and dealing with the consequences of working in a new medium.

The Submission System

To give you a feel for how the software works, I'd like to "track" a manuscript submitted to Conservation Ecology through to publication.

Manuscript tracking: Submission

Authors play a key role in submission to *Conservation Ecology*. At present articles must be submitted by email. However, the web upload feature shown below which can be used to submit a response to an article (a highly simplified kind of article) will soon be amended for all articles.



All journals have formatting guidelines. Unlike other journals where formatting focuses on the journal's visual style, and language and citation preferences, formatting for Conservation Ecology is geared to preparing the manuscript for automated handling by our software. Relatively few changes from the familiar formats of print journals were required in the end to satisfy the Conservation Ecology system requirements.

- Each text, figure, table, or appendix must be submitted as a separate file. This is similar to print journals that require that these be each submitted on a separate page at the end of the article.
- "Tags" must be inserted to identify parts of the article (e.g., title, abstract, keywords, text, appendices), and author information (e.g., name, address). We provide a text template for authors to copy into their word processing package and use.
- A "List of Attachments" is required. This list includes the caption for each table, figure, and appendix (similar to print journal requirements that captions for figures be listed seperately in a "List of Figures"). The software then links the caption to the appropriate file. This split between caption and content allows readers to peruse the figure caption while waiting for the related graphic to load.

The automated submission module

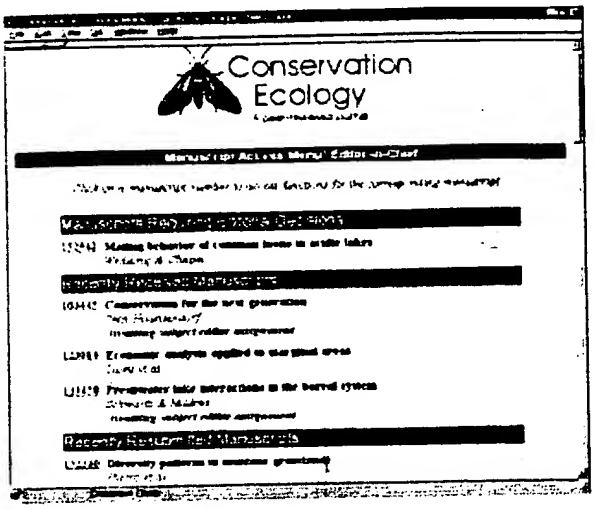
The above formatting provisions allow the software to:

- assign a manuscript number and start a database entry for the article;
- mount an HTML version of the complete article (text, figures, tables, and appendices) without author information and acknowledgments at a password-protected review site (we run double blind review);
- create ASCII versions of acknowledgments, abstract, keywords, author, and title information for use in messages to authors, editors, and reviewers;
- initiate the manuscript tracking software, send an acknowledgment of receipt of the article to the author, and notify the EIC of new submission.

Manuscript tracking: the editor-in-chief

Having been notified of the new submission by email from the system, the editor-in-chief (EIC) consults the new manuscript on-line using the EIC web page which includes links to

the articles in process by category (see figure below). The EIC specifies a list of potential editors in order of priority. The system now contacts the first editor on that list by email. By requiring that the Editor-in-Chief supply more than one potential editor, we eliminate the potential for time delay should the first editor contacted not be able to handle the manuscript at that time.

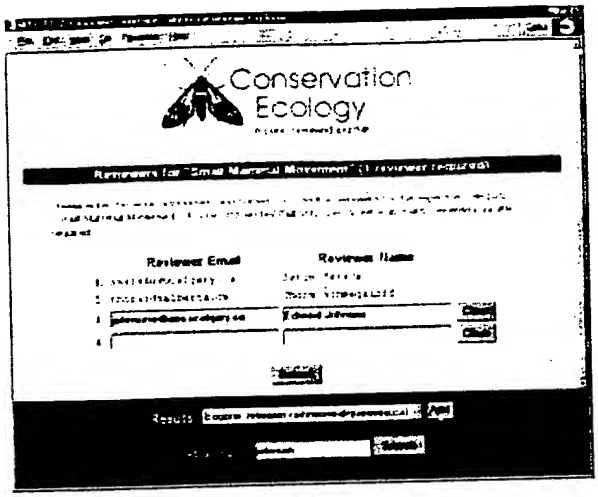


Manuscript tracking and peer review: The subject editor

The subject editor (SE) consults the MS on line and if appropriate for review, the SE sends to the system:

- a list of expertise categories (e.g. small mammal movement),
- the number of reviews required from each of these, and
- a prioritized list of potential reviewers for each category.

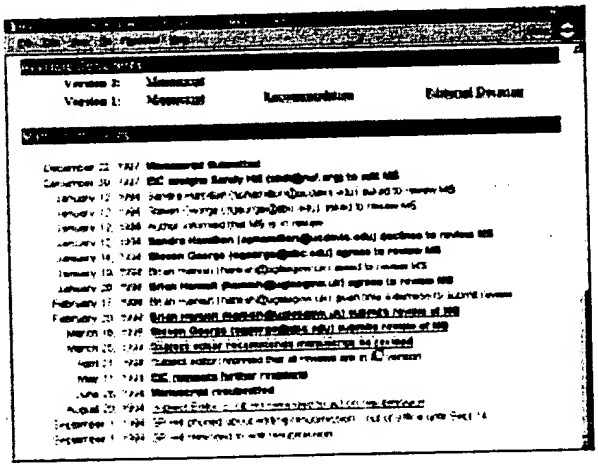
The expertise categories allow the subject editors to flag reviewers to attend to particular aspects of the article according to their expertise. In the example below, "small mammal movement" has been identified by the subject editor as an area requiring special attention for this manuscript. As for the Editor-in-Chief's specification of potential subject editors, the subject editors is required to recommend 2-3 times the number of potential reviewers as is ultimately required.



The software now contacts the required number of reviewers in each category, starting from the top of the list for that category. The software keeps track of:

- who has agreed to review and sends them review instructions,
- who has not yet responded to the request and nags them,
- which category requires another reviewer to be contacted as a potential reviewer contacted earlier has declined (note that the reasons for declining, if supplied, are passed on the to SE), and
- when the SE needs to be contacted for additional potential reviewers.

All this information is captured in the database and can be viewed, by the Editor-in-Chief, managing editor, and subject editors, through reports such as the manuscript history shown below.

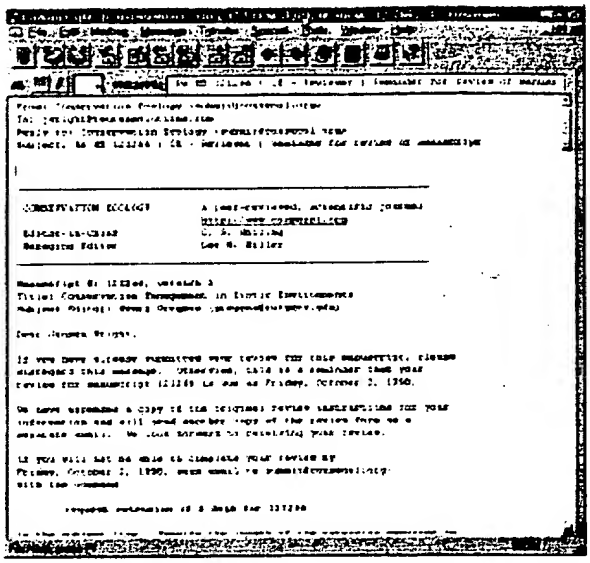


Manuscript tracking: the nagging system

At the heart of the manuscript tracking and peer review software is the timing and "nagging" system. This system comprises:

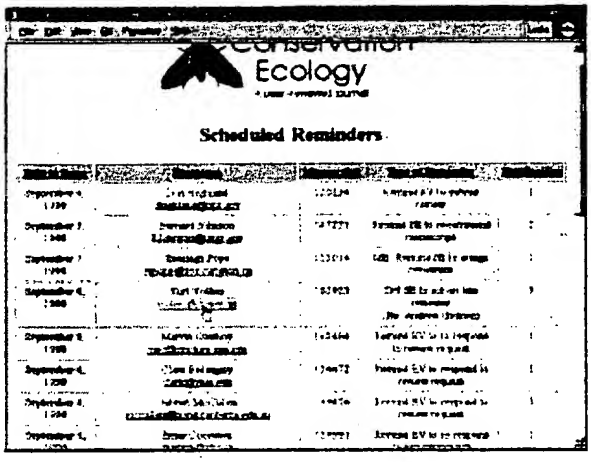
- time frames (how long each activity should take),
- reminder and nagging loops (e.g. prompting a reviewer that their review is due in 3

days, telling them that it is due today, telling them that it was due last week), and
- chains of command - who should be contacted if particular reminders don't elicit a response (if a reviewer doesn't submit a review after two late reminders, then the SE is notified, appraised of the history, and asked to intervene).



Since these processes are automated, they work at night, on weekends, and on holidays unless you tell them not to (we adjust deadlines over the Christmas/year end period, for example).

You can see from the list of scheduled reminders below, how the system is set up to nag people unless they deliver reviews, recommendations, and decisions on time.



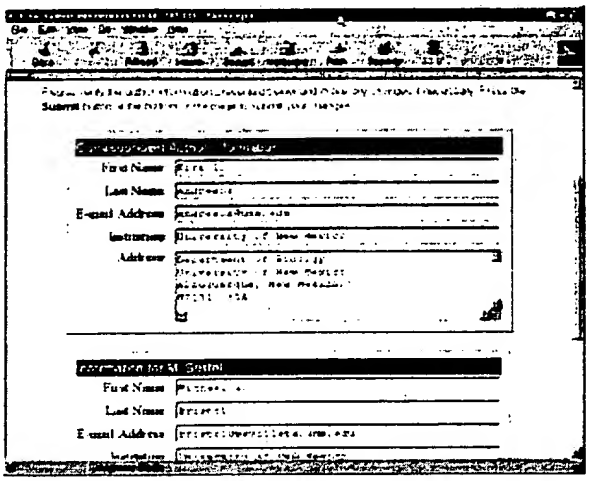
Manuscript tracking and peer review: copyediting

Once the reviews are submitted, the subject editor has made a recommendation, and the Editor-in-Chief has accepted the manuscript, the software automatically

- creates the "copy edit" draft,
- places this in a password protected ftp site, and

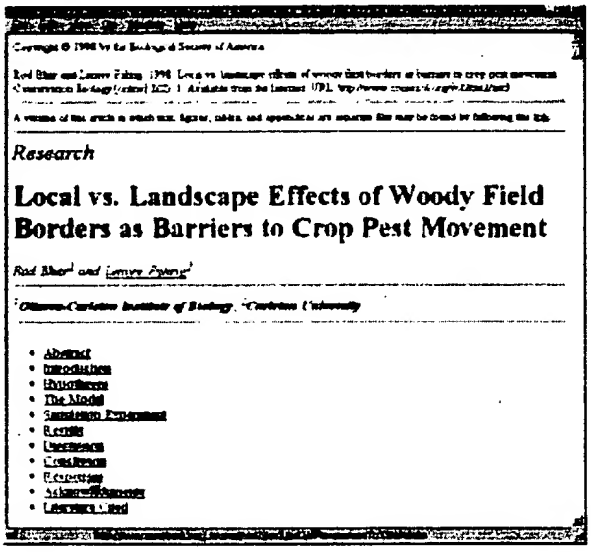
- notifies the copy editor.

The copy editor works on an html version of the manuscript. Information such as the title, author, and keywords that is used in several locations is edited by the copyeditor using a web screen so that the database is updated and the different presentations of this information are consistent (e.g. Table of Contents, abstract file, metadata).



Manuscript tracking and peer review: publication

Once copyedited, the final version is created; volume, issue, and article numbers assigned; and the authors contacted to approve the on-line proofs (still at the password protected review site). Upon approval by the authors, the article is mounted in a publicly-accessible article directory, and the table of contents of the Issue-in-progress is updated. At regular intervals (at present biannually) a volume is declared complete and subscribers are automatically notified of its contents by email.



Did we meet our objectives?

SPEED

With the automated peer review system, all clerical steps (e.g. acknowledgement of receipt of a manuscript, nagging and prompting messages) are substantially faster. The machine works on weekends and at night. The sending out of prompts, reminders, and acknowledgements is not constrained to "normal business hours". In an international working environment, immediate response to incoming messages and commands can save several days as delays due to incongruent time zones are avoided. The software has no "time zone".

It is not clear whether we have realized any gains where people are required to make decisions -e.g. reviewing and editing - these still take time. However, we will be amending the time frames for all steps in the process shortly to see if we can speed people up. Such an experiment is achieved simply by setting new values for the time steps for each process. Should the experiment prove unsuccessful, or successful only in certain areas, then we can simply reset the relevant values to the original settings.

Copy editing is much faster as the bulk of the formatting is done automatically. Publishing is faster both do to automated formatting and table of contents creating as well as the fact that articles are published as they are copyedited in an "Issue-in-Progress".

COSTS

It is difficult to quantify the savings realized, as we are still in a development with regard to the software. However, it is clear that we are realizing savings through the software even before development is complete.

Database entry is minimized as the authors and the software do the bulk of this. All standard clerical steps - acknowledgements, nagging, prompt - are automated. No paid staff are required to do these tasks. All correspondance is conducted by email, and is therefore free. Formatting, for both copyediting and publication, are done by software. Printing and distribution costs eliminated as *Conservation Ecology* is published only on line.

We have incurred some additional costs. We require a 1/2 time production editor to confirm conversion to HTML was successful for submitted articles and to correspond with authors. As we run our own server (on a Sun SparcStation 4), we employ a 1/4 time system administrator and have incurred hardware costs.

Unanticipated benefits

There are numerous benefits to the software that we had not anticipated when we set out to create an automated editorial office. One such benefit is archiving. All versions of the manuscript are archived by the software (including all author and title information which may change between versions). All correspondance to and from the software is logged automatically. Correspondance outside of the system can be added to the log by the editor-in-chief, managing editor, and subject editors. Lastly, we archive a complete record of the timing of all events associated with a particular manuscript.

Meta data was not a concern for us when we began this project in 1993. However, having

all the necessary information stored in an electronic database makes it easy to build metadata and apply to published article as part of formatting template. It would also be a simple matter to change or update the format of that metadata as standards evolve.

Lastly, putting the entire process of running a journal on-line removes the requirement to have a centralized editorial office. Access to information is available on a platform independent basis over the web. The degree of access to the database is determined by username and password access codes that tell the software what level of information to display (reviewers never see the authors' names when they review of manuscript, whereas the subject editor does) and whether the user has read only or write access to the database and to what sections.

The distributed nature of access to the system allows journal participants to contribute to the peer review process from anywhere at anytime. They do not have to have access to their PC on their desktop to do their job for *Conservation Ecology*. Journal participants don't have to maintain separate files on the manuscripts on which they are working. By providing them with simple web-tools to do keep track of the manuscripts on which they are working, we facilitate and reinforce the updating of the journal database files.

What next: Improving the software

The software will have to be continually updated to keep pace with developments in authoring tools (e.g. word processor and graphics packages) and on-line publishing (e.g. XML, mathML). We would like to move to an SGML base, rather than HTML, to give us the flexibility to output to a wide variety of formats (e.g. HTML, print, CD Rom) and for better archiving.

We would like to upgrade to a new database. We use a shareware database called mySQL which works, but is rudimentary and slow. We're looking into purchasing a commercial database and ammending the software to take advantage of it.

By the end of this year we will have finished developing and testing this first version of the software. We will have the web interfaces built that allow authors, reviewers, and editors to interact with the journal software using the point and click environment of the web as well as using email. We will have processed about 100 manuscripts in 1998 with the software.

So, we're at a point where we've got a working piece of software that handles the bulk of the clerical steps of running a journal on it's own, structures the review process with prompts and nagging to keep it on time, tracks all the transactions associated with a manuscript, and allows reviewers, editors, and authors to participate in the peer review process from around the world.

What next: Generalizing the software

We'd like to move the software forward to a generalized form. By generalized, we mean able to handle the peer review system for any journal, and also possibly for grant review and conference abstracts or proceedings.

We'd like to make the software more robust and increase its capacity to handle any volume

of manuscripts. The current version of the software, largely due to the database, is limited in the number of manuscripts that it can handle efficiently. We're running around 100 a year now without a problem, but a volume of 1000 or more would be cumbersome to handle with the current system.

Achieving generalization

What will it take to make the software generalized?

- A "configuration" interface that allows the software user to set the system up for their particular situation - including management structure, time settings for prompts and nagging, adjusting the templates for the format of the output and reports.
- Complete documentation.
- A help system - so that end user can install the software and troubleshoot.

We had always hoped that the software and our experience would benefit more than just one journal. There are now a number of on-line journals using the web to "distribute" papers during review. Some journals even allow the authors to check the status of their manuscripts online. No journal that we know of has automated the entire peer review process and integrated it with online submission and publication.

Conservation Ecology is interested in partnering with other societies and publishers to refine the software for our mutual benefit. The software works for our case. To make it work for other journals, we need input from other societies, and other publishers.

We have already invested US$233,000 in *Conservation Ecology*, the new journal, and in the peer review software. We're interested in developing a consortium of society publishers to take the software forward. We would like the gains realized from electronic publication to extend beyond cutting the costs of printing and distribution from the budget. We'd like to see other journals benefiting from the shift to the new medium and the opportunities that that shift presents.

We have not yet defined the structure of such a consortium. Rather we are inviting others interested in realizing the full benefits on on-line publishing to join a discussion as to how best to achieve this. Please contact Shealagh Pope, the Project Coordinator for the Conservation Ecology Project, at sepope@consecol.org if you have any comments or questions.

Conservation Ecology -- Main Site

EXHIBIT D

Research Elsewhere

Open Peer Review & Argumentation: Loosening the Paper Chains on Journals

Tamara Sumner and Simon Buckingham Shum of the Knowledge Media Institute of the Open University, describe the design and implementation of the Journal of Interactive Media in Education, as well as some of the issues behind the approach that this journal takes to the process of scholarly review.

Contents

Summary

The emergence of the internet and the World Wide Web (WWW) have potentially profound implications for scholarly practice, particularly in the submission, review, and publication of articles in journals. However to date, much of the impact of these new technologies on journals has been on digitising the *products* of journal publication; the scholarly *processes* involved in reviewing articles remain unchanged and unsupported. We are using computer-supported collaborative argumentation (CSCA) tools to rethink and redesign the process of scholarly debate at the heart of journal reviewing. This paper describes the design principles behind our approach, how they are currently being realised in the context of a specific new journal, and discusses some of the issues that this approach raises.

Keywords: digital journals, argumentation, electronic publishing, hypermedia, WWW

The shift from paper to digital media

The emergence of the internet and electronic publishing have far reaching implications for the way in which knowledge is disseminated and sanctioned within scholarly communities, which since the Gutenberg revolution in printing has been shaped by the affordances of paper. Currently, we are witnessing the beginnings of a shift from paper to digital media in the submission, review and publication of scholarly work. In many journals, it is now standard procedure for reviews and submissions to be transmitted electronically. Sometimes, automated systems are in place for matching reviewers with submissions based on keyword analysis. In a few cases, the final version is even published electronically as a set of HTML files available on the WWW. Thus to date, this shift from paper to digital media has mainly affected the products of publication. Various documents are becoming digital and some activities are automated, but the actual process of scholarly work has not changed to a great extent.

What remains completely unsupported is the intellectual 'meat' of scholarly publication, the review process itself. This remains a private affair involving a small number of reviewers, and in most paper-based journals, the gap between initial submission and article publication can be dragged out over a year. The potential of internet technologies for opening up and revitalising the scholarly debate process has yet to be realised.

Argumentation: the heart of scholarly debate

What is the nature of intellectual work in the peer review process? Reviewing a submission involves drawing on certain criteria (e.g. theoretical content; empirical content; presentation quality; appropriateness for the publication) to evaluate the quality of reasoning and evidence provided, to probe for weaknesses, acknowledge strengths, and question background assumptions. In effect, reviewing is an argumentative process where reviewers are engaging in an imaginary debate with distant authors who are not present to respond to their analysis. This paper-based review model has shortcomings in that questions go unanswered; confusions go unclarified; criticisms go undefended. The dynamic cut-and-thrust of debate normally found in face-to-face contexts such as workshops or conferences is not supported by the paper-based review processes, nor is it yet being realised in the new electronic media.

We are currently rethinking the review process to use new technologies in order to recapture the best features of a dynamic scholarly debate. This rethinking is guided by existing research into hypertext-based, computer-supported collaborative argumentation. Argumentation research is concerned with developing notations and tools to facilitate public debate and negotiation.

The remainder of this paper will begin by reviewing previous work in argumentation and distilling important design guidelines for creating argumentation tools. Next, we will describe how these guidelines are being followed in the context of a specific new, tool-supported journal publication. Finally, we discuss some of the issues which may be encountered in the new review model and its supporting technology.

Computer-Supported Collaborative Argumentation (CSCA)

CSCA research has focused on designing notations to support debate processes [1, 3], creating computational tools to support using the notations [4, 6, 9] and understanding the

organisational contexts and work practices necessary for such notations and tools to succeed [5, 11]. Key lessons have been learned from previous research that point to design guidelines in each of these three areas:

- **Lesson 1:** Avoid elaborate and rigid notations. Much research has focused on finding the "right" notation to support debate. Often, the resulting notations require people to express their thoughts using elaborate sets of provided distinctions such as positions, issues, comments, pros, and cons. This, however, runs the risk of burdening people with excessive representational overhead by forcing them to categorise and commit their thoughts to rigid notations before they are ready. Empirical findings indicate that people are often unwilling and sometimes even unable to do this [1, 2, 10].

- **Lesson 2:** Computational tools must integrate argumentation with the artifacts being discussed. Early Csca approaches separated the argumentation from other artifacts (i.e., the papers and drawings being discussed). This separation hindered users from (i) quickly accessing relevant argumentation when it was most needed during problem-solving, and (ii) easily adding new argumentation. Later work has shown that tools must support users to bridge the separation and move seamlessly in both directions between the artifact and argumentation [4, 8].

- **Lesson 3:** Work practices must be redesigned so that argumentation is integral to the task being performed. Empirical studies indicate that ~~people often~~ do not contribute to argumentation because it is perceived as extra work over and above what they are already required to do [5]. Successful ~~argumentation~~ approaches have redesigned work practices to make contributing to ~~argumentation~~ integral to the overall task being performed [11].

A CSCA environment for scholarly debate

Our goal is to develop a CSCA environment for scholarly review of journal submissions which takes into account these three lessons. This environment is being developed to support the reviewing process of a new scholarly journal, the Journal for Interactive Media in Education (JIME).

The JIME Web environment has been carefully designed in accordance with three design principles deriving from the three lessons introduced above.

Principle 1: Begin with a simple argumentative notation

The notation used to support reviewing in JIME has one primary class of contribution called *comments*. Optionally, debaters may choose to categorise comments as *agreements* (flagged as ) or *disagreements* (). The power of the Web means that reviewers may elect to include pointers to *evidence* in their comments; evidence can be either plain text (e.g., "See Conklin & Begeman, 1988") or a Web hyperlink direct to an online source. Thus, a body of secondary evidence may grow around an article under review, providing a valuable resource for both readers and authors.

Principle 2: Integrate the publication with the argumentation

Prior to publishing for open debate, JIME submissions are marked-up to include special argumentation tags ( ). Each major document section and the interactive demonstrations are prefaced with these navigation tags. Clicking on one takes the reader to the argumentation about that document section, in the Review Window. Conversely, from the Review Window, debaters can easily switch back to any part of the publication. Figure 1 shows the user interface for reading an article in the JIME Web environment. Reviewers can also download an Acrobat version since we believe that there is still a strong preference for being able to read a paper version. Thus, a reader/reviewer has two main 'work spaces' in JIME - the Article Window for reading, and the Reviews Window for making review comments, which are automatically opened and brought to the front as needed.

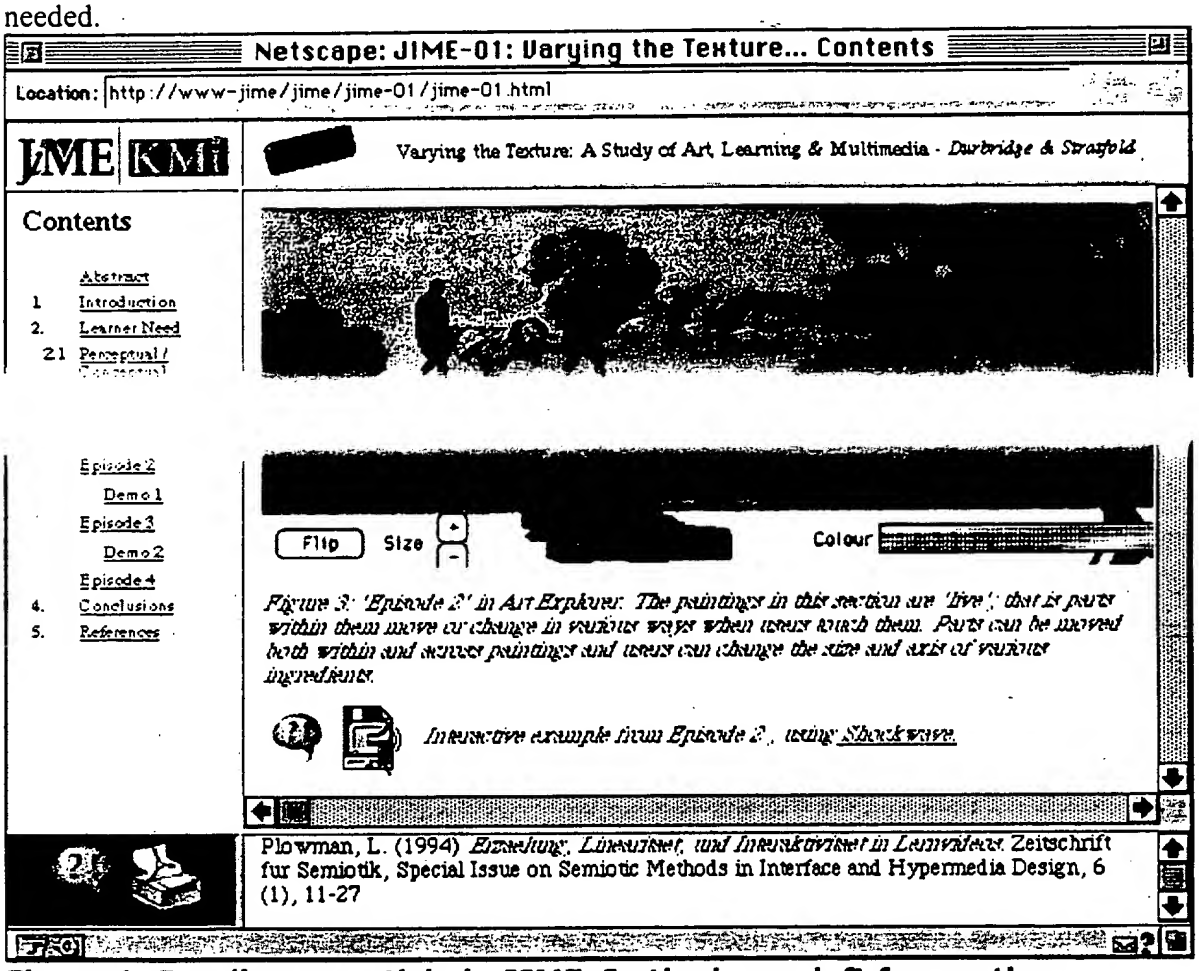


Figure 1: Reading an article in JIME. In the lower left frame, the Comment icon takes the reader to the top of associated Review Window (see Figure 3 below). The printer icon allows the reader to download an Adobe Acrobat version for printing. In the main frame, the Comment icon takes the reader to the review comments about this figure and associated demonstration. The Demo icon takes the reader to a Macromedia Shockwave demo of the system (see Figure 2).

Figures 2-4 show screens for trying out a demonstration (Fig. 2), displaying the Review Debate about an article (Fig. 3), and reading Reviews about a particular section of the article (Fig. 4). The Review argumentation is added and manipulated using an environment which we have created by tailoring the NCSA HyperNews system [7].

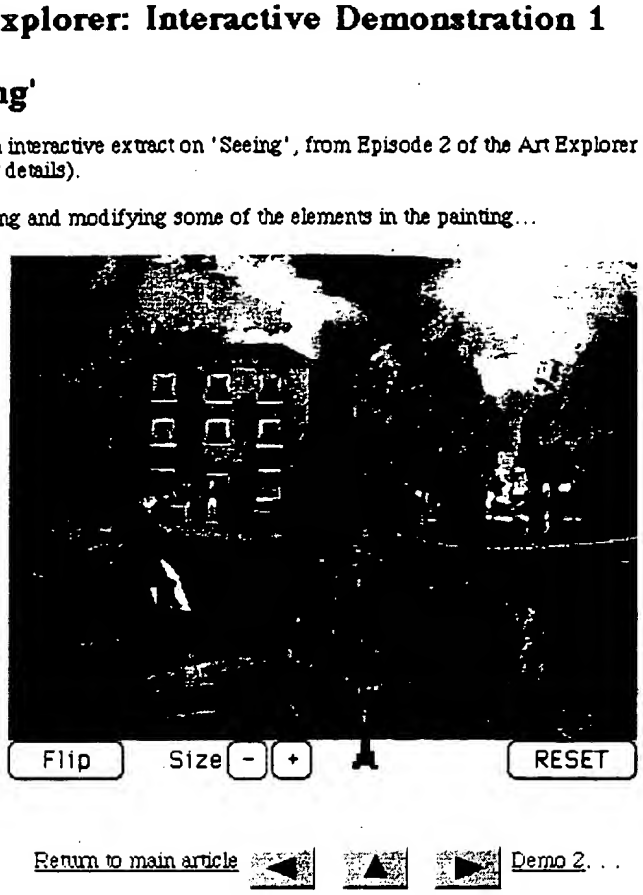


Figure 2: Authors describing a new system must submit demonstrations of it using an appropriate technology. The above example shows an interactive demo using the Macromedia 'Shockwave' plug-in. This allows readers and reviewers to interact with the system described in the article, as though they were students using the original application.

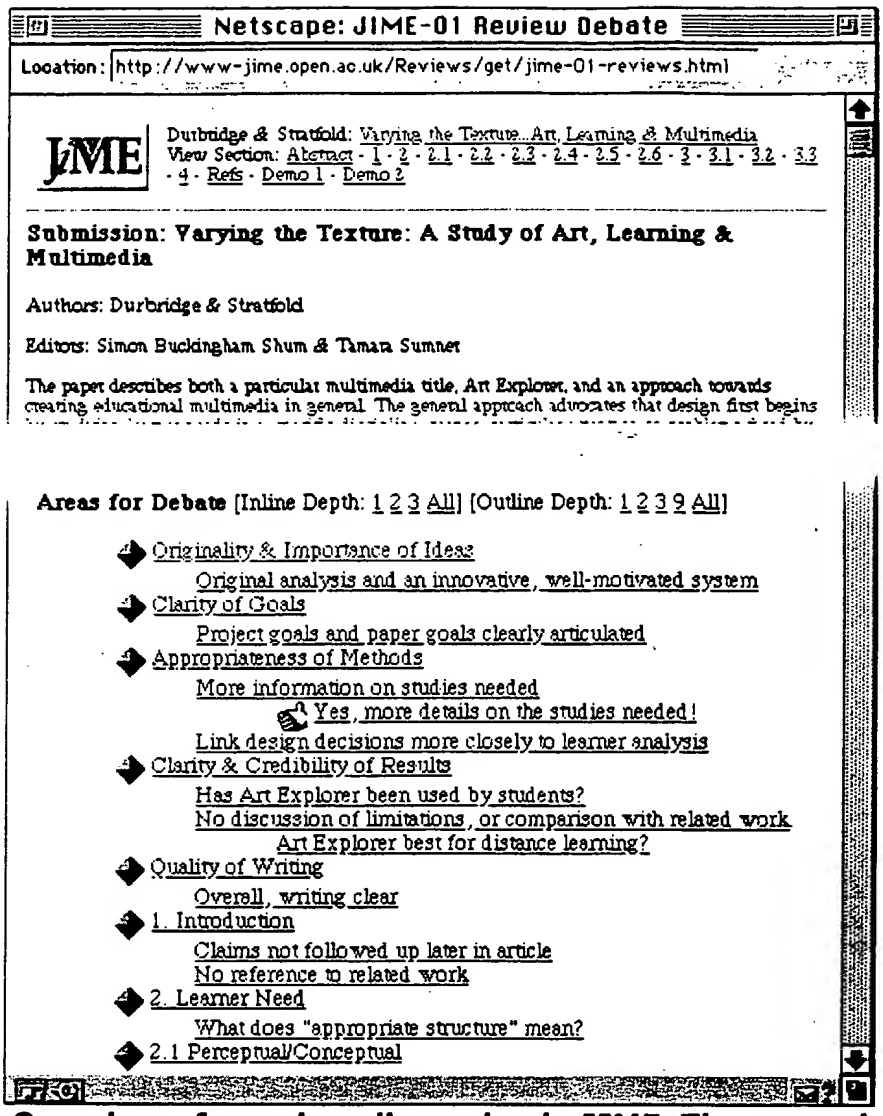


Figure 3: Overview of a review discussion in JIME. The example shows the outline view with headings for general categories of comment (e.g. Clarity of Goals; Credibility of Results), followed by headings which match the headings in the article. Section-sepcific comments are placed under these.

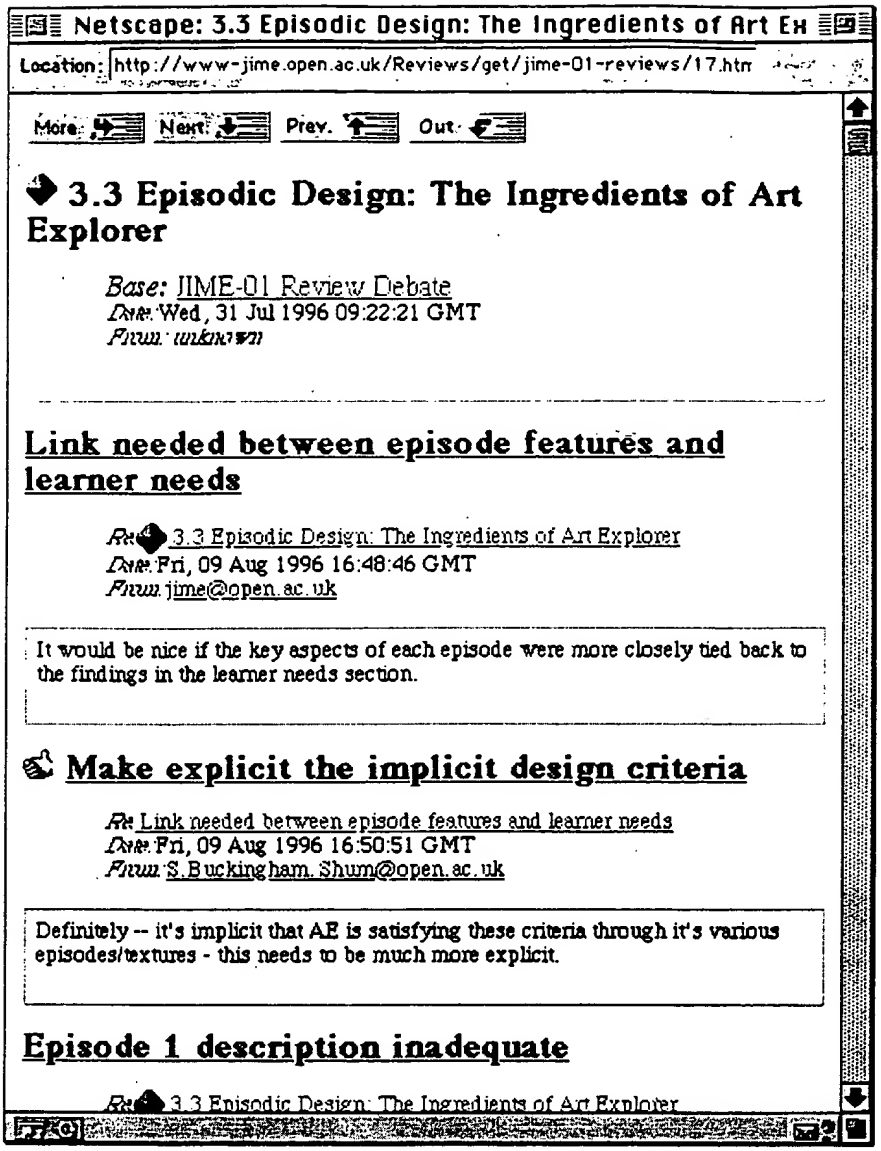


Figure 4: Details of a Review discussion in JIME. The example shows review comments about a specific section in the article (3.3).

Principle 3: Make argumentation integral to the review process

The proposed review model for JIME submissions is shown in Figure 5. This model changes the role of participants in the process to directly involve generating and manipulating argumentation. Reviewers return their comments to the editor in the JIME argumentative format. The editor pulls together all the reviews to seed the argumentative debate. The publisher marks-up the publication and the initial argumentation to include the special cross-tool navigation tags. The article under review and the reviewers' initial comments are then published on the Web, and the review process moves into a phase of open peer review, in which authors, reviewers and readers can engage in debate. The editor then decides whether the article should be accepted, and formulates change requirements for the authors. We also wish to allow for the possibility that interesing

discussion threads may arise during the review process which could be distilled into commentaries for publication with the final article.

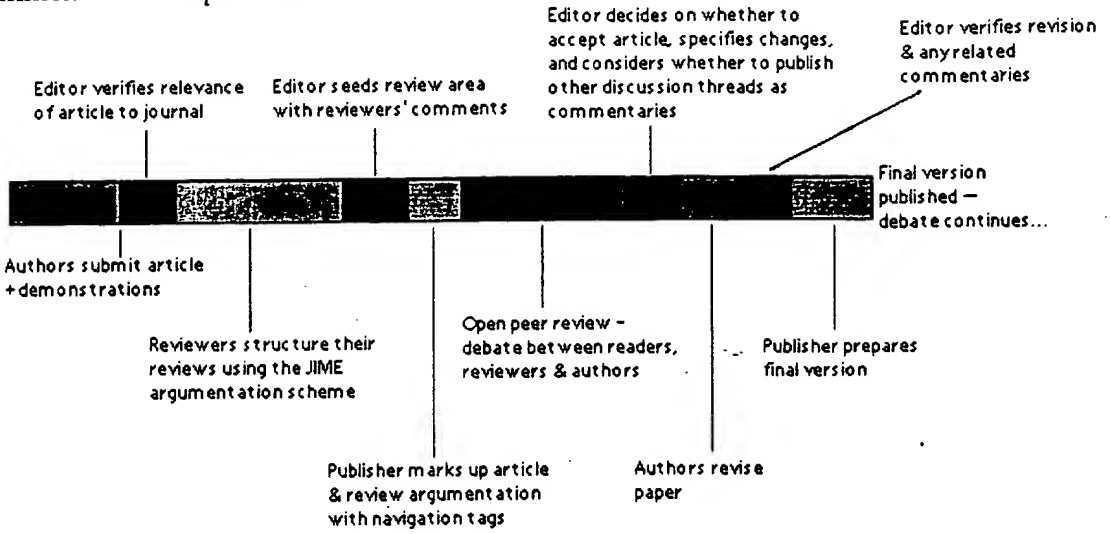


Figure 5: Lifecycle of a JIME article under review.

Once the article is published, debate about it will continue. Wth conventional journals, it is only at this point that debate would begin, perhaps a year or more after initial submission. Even then, the debate is not tightly linked to the article, but located in other articles, often published in other journals, at substantially later times. In JIME, discussion can continue directly linked to the published article, or via external links to related articles at other sites.

To summarise our design philosophy:

- JIME is not simply making the *conventional media* of paper-based articles available on the Net, but addressing the *interactive dimensions* which are the essence of the new media;
- JIME is not simply adding an e-mail listserver to allow *peripheral discussion* about *published* articles, but developing a journal review environment in which *submitted* articles and *open peer review* are *tightly integrated* with each other, and *central* to the journal's operation.

Discussion

This project is still in its early design stages and the details of the current interface will undoubtedly change as it undergoes further implementation and user testing. However, we feel it is important to discuss work such as this in its early stages in order to encourage more participation and dialogue between scholars concerning future publishing practices. We believe the review model presented here offers several benefits for opening up and revitalising scholarly debate. However, there remain many open issues to be resolved.

Some issues relate to the user interface for supporting collaborative, Web-based argumentation. For instance, the Web introduces new concurrency challenges regarding timely updating of reviewers' screens with new contributions to the

discussion. Additionally, Web-based systems offer impoverished degrees of interactivity compared to what we now expect from direct manipulation interfaces, limiting our ability to take advantage of new developments in graphical argumentation tools.

Another issue raised by our proposed model is the perceived risk which authors may feel when exposing publications to large audiences at the review stage. Submissions will be critiqued by many more reviewers than is currently possible in the conventional review process, and this will take place in a public rather than private forum. The willingness of authors to do this depends greatly upon the professionalism and netiquette exhibited by reviewers. The philosophy behind this model is that perceived risks of this sort will be outweighed by the benefit to authors of quicker, more extensive, and more relevant feedback, resulting ultimately in higher quality publications.

To conclude this brief article, we should not be surprised that electronic journals meet with resistance from some quarters, since they force to the surface huge issues which entail rethinking how scholarly knowledge is disseminated and sanctioned. This is the time to reflect radically and creatively on the 'papyrocentric' scholarly practices which have until recently been taken for granted. JIME is pushing the boundaries of electronic journals one step further with its Web-based open peer review. This seems to us the logical direction in which to take journals. We await your reactions with interest.

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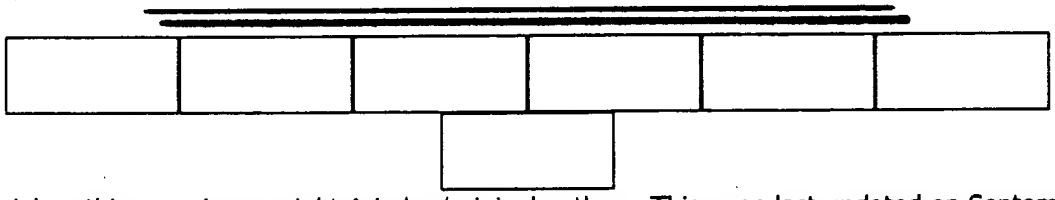
The Journal of Interactive Media in Education is at: http://www-jime.open.ac.uk/jime/

Open peer review of the first submission to JIME begins on 2nd Sept.'96. We invite all Ariadne readers to participate and leave comments, either on the article itself if this is an area in which you are qualified, or on the journal's design more broadly.

An earlier version of this article was presented at HCI'96, Annual Conference of the British Computer Society on Human-Computer Interaction, London, 20-23 August, 1996.



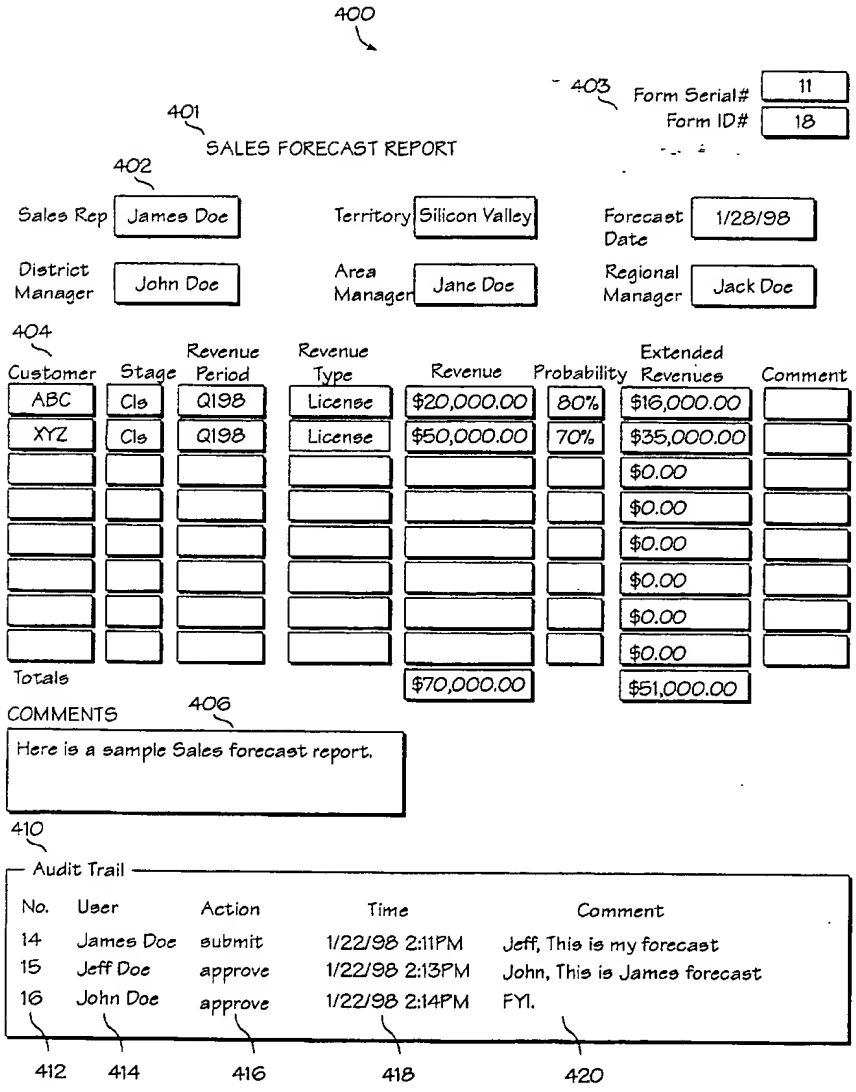


Fig. 4

Exhibit E